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NATIONAL DAM INSPECTION PROGRAM. SILT POND B, (NDI NUMBER PA 00---ETC(U)  
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OHIO RIVER BASIN,  
PIGEON CREEK,  
WASHINGTON COUNTY,

PENNSYLVANIA.

NDI No. PA 00824

PENN DER No. 63-77

National Dam Inspection Program

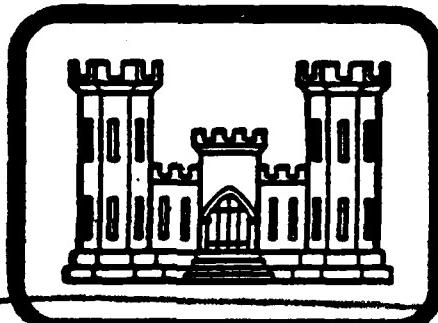
SILT POND B  
(NDI Number PA 00824  
PENN DER Number 63-77)

UNITED STATES STEEL CORPORATION,  
RAW MATERIALS DIVISION.

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

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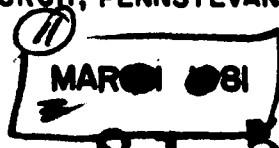
PREPARED FOR

DEPARTMENT OF THE ARMY  
BALTIMORE DISTRICT, CORPS OF ENGINEERS  
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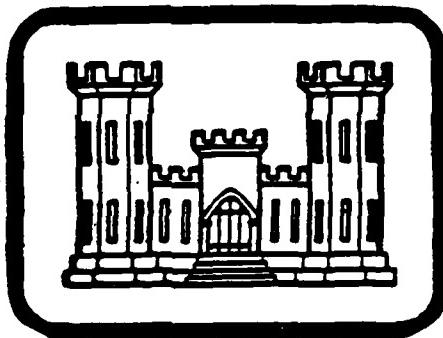
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OHIO RIVER BASIN

SILT POND B  
WASHINGTON COUNTY, COMMONWEALTH OF PENNSYLVANIA  
NDI NO. PA 00824  
PennDER NO. 63-77

UNITED STATES STEEL CORPORATION

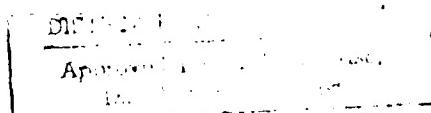
PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM



Prepared for: DEPARTMENT OF THE ARMY  
Baltimore District, Corps of Engineers  
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Date: March 1981



## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigations and analyses involving topographic mapping, subsurface investigations, materials testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify the need for such studies which should be performed by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some time in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Design Flood is based on the estimated "Probable Maximum Flood" (PMF) for the region (greatest reasonably possible storm runoff), or fractions thereof. The Spillway Design Flood provides a measure of relative spillway capacity, and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS

NAME OF DAM: Silt Pond B  
STATE LOCATION: Pennsylvania  
COUNTY LOCATION: Washington  
STREAM: Unnamed tributary to Pigeon Creek.  
DATE OF INSPECTION: 4 December 1980  
COORDINATES: Lat. 40° 11' 21",  
Long. 79° 58' 38"

ASSESSMENT

Based on a review of available design information and visual observations of conditions as they existed on the date of the field inspection, the general condition of Silt Pond B is considered to be good.

This assessment is based primarily on visual observations of the embankment and appurtenances and hydrologic/hydraulic analyses of reservoir/spillway capacity.

The structure is classified as an "intermediate" size, "high" hazard dam. Corps of Engineers guidelines recommend the Probable Maximum Flood (PMF) as the Spillway Design Flood for an "intermediate" size, "high" hazard dam. Silt Pond B's Spillway Design Flood is the Probable Maximum Flood. Spillway capacity is "adequate" because the non-overtopping flood discharge was found, by using the HEC-1 computer program, to be in excess of 100 percent of the PMF.

The field inspection indicated several minor deficiencies which can be corrected or improved through implementation of the following recommended evaluation, remedial and/or maintenance efforts.

RECOMMENDATIONS

1. Emergency Operation and Warning Plan: The owner should develop an Emergency Operation and Warning Plan including:
  - a. Guidelines for evaluating inflow during periods of heavy precipitation or runoff.
  - b. Procedures for around the clock surveillance during periods of heavy precipitation or runoff.

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS (CONT'D)  
Silt Pond B

c. Procedures for removal of standing water in the reservoir under emergency conditions.

d. Procedures for notifying downstream residents and public officials, in case evacuation of downstream areas is necessary.

2. Remedial Work: The Phase I investigation of Silt Pond B disclosed several minor deficiencies which should be corrected. The recommended remedial work should include:

a. Repair of the wet zone on the downstream slope;

b. Repair of the landslides on the emergency spillway cut slope; and

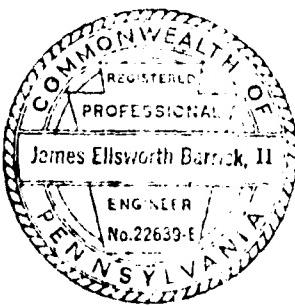
c. Removal of debris from the trash cages on the active intake port and outlet structures.

Also, the origin of the flowing water in the lower right groin should be determined and corrective measures taken if required.

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Project Engineer

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Approved by:

*JAMES W. PECK*  
JAMES W. PECK  
Colonel, Corps of Engineers  
District Engineer

*5 MAY 81*  
Date

SILT POND 8



OVERVIEW

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PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM  
SILT POND B  
NATIONAL I. D. NO. PA 00824  
PennDER No. 63-77

SECTION 1  
PROJECT INFORMATION

1.1 GENERAL

a. Authority: This Phase I investigation was performed pursuant to authority granted by Public Law 92-367 (National Dam Inspection Act) to the Secretary of the Army through the Corps of Engineers, to conduct inspections of dams throughout the United States.

b. Purpose: The purpose of the investigation is to make a determination on whether or not the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

a. Dam and Appurtenances:

(1) Embankment: Silt Pond B was designed and constructed as a earthfill structure with clay core and cutoff along the centerline. The embankment is about 350 feet long, with a toe to crest height of 43.4 feet and a crest width ranging from 15 to 20 feet. The embankment's upstream slope was observed to be 2.8H:1V above the erosion protection blanket and 2H:1V in the blanket zone. The downstream slope was observed to range from 2.7H:1V to 2.9H:1V.

(2) Principal Spillway: The principal spillway for Silt Pond B consists of a 16 inch diameter stainless steel pipe through the embankment near the centerline.

The intake structure consists of numerous 18 inch diameter steel elbows (90 degrees) welded to the conduit. These inlet ports are positioned so that discharge can be maintained as the bottom of the reservoir rises due to the deposition of sediments carried by runoff from the upstream refuse area.

The outlet control structure lies at the toe of the embankment and consists of a reinforced concrete valve house that contains a 16 inch gate valve.

(3) Pond Drain: The intake ports of the principal spillway riser act as a pond drain for this facility.

(4) Emergency Spillway: The emergency spillway is a 61.9 feet wide, trapezoidal open channel cut into rock on the right abutment.

(5) Freeboard Conditions: Freeboard between the low point on the embankment and high point in the emergency spillway crest is 4.3 feet. The pool level, at the time of inspection, was 26.4 feet below the minimum observed embankment elevation.

(6) Downstream Conditions: The unnamed creek below the Silt Pond B flows through a relatively narrow, steep-sided valley for about 1.3 miles to a confluence with Pigeon Creek at Hazel Kirk, Pennsylvania. Pigeon Creek enters the Monongahela River near Monongahela, Pennsylvania. In the first 1.3 miles below Silt Pond B, at least seven inhabited dwellings lie on the floodplain.

(7) Reservoir: Silt Pond B's reservoir is about 1150 feet long at the emergency spillway crest elevation and has a surface area of about 5 acres. When the pool is at the crest of the dam, the reservoir length increases to 1550 feet and the surface area to about 7.0 acres.

(8) Watershed: The watershed contributing to Silt Pond B is a grass and brushland. The watershed is owned by the U. S. Steel Corporation.

b. Location: Silt Pond B is located in Carroll Township, Washington County, Pennsylvania approximately 3 miles west of Monongahela, Pennsylvania.

c. Size Classification: The dam has a maximum storage capacity of about 60 acre-feet and a toe to crest height of 42.5 feet. Based on the Corps of Engineers guidelines, this dam is classified as an "intermediate" size structure.

d. Hazard Classification: Silt Pond B is classified as a "high" hazard dam. In the event of a dam failure, at least seven inhabited dwellings could be subjected to substantial damage and loss of more than a few lives could result.

e. Ownership: Silt Pond B is owned by the United States Steel Corporation, Raw Materials Division, Frick District. Correspondence can be addressed to:

United States Steel Corporation  
Raw Materials Division, Frick District  
Fayette Bank Building, 5th Floor  
Uniontown, Pennsylvania 15401  
Attention: Mr. Robert Witt, Jr., Chief Engineer  
(412) 438-3511, Ext. 256

f. Purpose of Dam: Silt Pond B was constructed to serve as a holding and settling impoundment for surface runoff from the proposed Refuse Area II immediately upstream of the site. The impoundment is part of the U. S. Steel Maple Creek Mine complex.

g. Design and Construction History: The dam was designed by the U. S. Steel Corporation in 1973. The embankment and appurtenances were constructed by the Great Lakes Construction Company of Cleveland, Ohio in 1977. No additional information on design or construction was found.

h. Normal Operating Procedure: Silt Pond B was designed to operate as an uncontrolled structure. Under normal operating conditions, the pool level (operating pool level) is maintained by the principal spillway.

### 1.3 PERTINENT DATA

a. <u>Drainage Area</u>	0.28 sq. mi.
b. <u>Discharge</u>	
Maximum Flood at Dam Facility	Unknown
Emergency Spillway Capacity	
at Top of Dam	1706 cfs
c. <u>Elevation (feet above MSL)</u>	
Current Top of Dam (average)	1043.4
Current Top of Dam (low point)	1042.5*
Design Top of Dam	1042.0*
Emergency Spillway Overflow Crest	1038.2
(maximum)	
Operating Pool	Varies
Operating Pool on Date of Inspection	1016.1
Principal Spillway Inlet Invert	Varies
Principal Spillway Outlet Invert	1000.0
Toe of Embankment	1000.0

d. Reservoir Length

Length of Maximum Pool	150 feet
Length of Normal Pool	1150 feet
Length of Current Operating Pool	200 feet

e. Reservoir Storage

Current Top of Dam	60 acre-feet
Design Top of Dam	56.8 acre-feet*
Emergency Spillway Crest	35 acre-feet

f. Reservoir Surface

Current Top of Dam	7.0 acres
Design Top of Dam	6.6 acres*
Emergency Spillway Crest	4.8 acres

g. Embankment

Type	Earth*
Length	350 feet
Height	43.4 feet
Crest Width	Varies from 15 to 20 feet
Slopes	
Downstream	2.7H:1V to 2.9H:1V
Upstream	2H:1V to 2.8H:1V
Impervious Core	Yes*
Cutoff Provisions	Yes*
Grout Curtain	None

h. Emergency Spillway

Type	Trapezoidal Open Channel
Location	Right Abutment
Overflow Crest Length	61.9 feet
Crest Elevation (maximum)	1038.2 feet

i. Principal Spillway

Type	16 inch Diameter*
Location	Stainless Steel Pipe*
Inlet Invert	Through Embankment
Trash Cage	Varies
Conduit Length	Yes
Gate Valve	230 feet*
Anti-Seep Collars	Downstream*
	Yes, 10*

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\* Taken or derived from available engineering drawings or reports.

SECTION 2  
ENGINEERING DATA

2.1 DESIGN

a. Design History: The initial Silt Pond B design was prepared by the owner's engineering personnel and an Encroachment Permit was issued in 1973. The permit was subsequently recalled by the Department of Environmental Resources and design information sufficient to support issuance of a dam permit was requested. A permit to construct and maintain Silt Pond B was issued on 19 November 1973.

b. Data Available: Data available for review included:

(1) The contents of PennDER files consisting of correspondence between owner's representatives and state personnel, the owner's hydrologic and stability calculations, a dam permit and state report on the proposed structure, and miscellaneous correspondence between local residents and state personnel.

(2) Design drawings and contract specifications prepared by United States Steel Corporation that were provided to the field inspection team by the owner.

(3) Discussions with a company representative during performance of the Silt Pond B field inspection.

2.2 CONSTRUCTION

a. Constructor: The dam was constructed between February 1977 and October 1977 by Great Lakes Construction Company of Cleveland, Ohio.

b. Modification: There were no reported modifications to the structure after its completion.

2.3 OPERATION

a. Dam: The dam was designed to operate without a dam tender and no operational data is available.

b. Principal Spillway: The principal spillway requires periodic attention because of the constantly rising level of sediment in the impoundment. As the silt level rises, successive inlet ports of the principal spillway intake structure are sealed off. Consequently, only a small amount of free water is impounded at any given time. The inlet ports are sealed when there is insufficient free water in the impoundment to permit adequate settling of silt.

c. Emergency Spillway: The emergency spillway is an uncontrolled open channel on the left abutment. It does not require the attention of operating personnel and needs only periodic maintenance.

#### 2.4 EVALUATION

a. Availability: Information was obtained from the Pennsylvania Department of Environmental Resources and was supplemented by drawings, specifications, and information obtained from a representative of United States Steel Corporation.

b. Adequacy: The available design information supplemented by field inspection and supporting engineering analyses presented in succeeding sections is adequate for the purposes of this Phase I Inspection Report.

c. Validity: There appears to be no reason to question the validity of the available design information and drawings.

SECTION 3  
VISUAL INSPECTION

3.1 FINDINGS

a. General: The field inspection of Silt Pond B was performed on 4 December 1980, and consisted of:

(1) Visual observations of the embankment crest and slopes, groins and abutments;

(2) Visual observations of the principal and emergency spillways including intake structures, outlet structures, and approach and discharge channels;

(3) Visual observations of the embankment's downstream toe area including drainage channels and surficial conditions;

(4) Visual observations of downstream conditions and evaluation of the downstream hazard potential.

(5) Visual observations of the reservoir shoreline and watershed;

(6) Transit stadia surveys of relative elevations along the embankment crest centerline, spillways, and across the embankment slopes.

The visual observations were made during periods when the reservoir and tailwater were at normal operating levels.

The visual observations checklist, field plan, profiles and sections containing the observations and comments of the field inspection team are contained in Appendix A. Specific observations are illustrated on photographs in Appendix C. Detailed findings of the field inspection are presented in the following sections.

b. Embankment:

(1) Crest: The crest of the embankment was straight throughout its length. No offsets or indications of misalignment were observed that would indicate anomalous movement of the embankment.

The crest was somewhat uneven vertically, but appeared to provide sufficient freeboard. At the left abutment, the crest rose significantly to meet the abutment. At the right end of the embankment, at the junction with the emergency spillway, the upstream portion of the crest dropped slightly toward the spillway.

The crest was entirely covered with a layer of gravel-size sandstone fragments that contained considerable vegetation growing through.

(2) Upstream Slope: The lower portion of the upstream slope was covered with a blanket of cobble-sized sandstone erosion protection. The blanket showed no signs of erosion or displacement but was heavily covered with Crownvetch over the upper portions of the slope. The erosion protection rose to within 5 feet of the embankment crest. Above this, the upstream slope appeared uniform and was completely covered with a dense layer of Crownvetch.

(3) Downstream Slope: The downstream slope was generally uniform and completely vegetated with a thick covering of Crownvetch. The lower portion of the slope was covered with a layer of cobble sized sandstone erosion protection which appeared to be in good condition.

Near the center of the downstream slope, approximately on the line of the principal spillway conduit, a barren area was observed where underlying coal refuse had been exposed. The area was wet and quite muddy but the origin of the water could not be determined. It did not appear to be the result of seepage from within the embankment. The area contained many deer tracks and was located along a deer trail.

Field measurements indicated the area was approximately six feet above the reservoir's existing pool level.

A flow of water, estimated at 5 gallons per minute, was observed in and beneath the erosion protection blanket in the lower right groin of the embankment. The exact origin of the water could not be determined because of the rock covering and dense vegetal growth on the embankment and abutment.

c. Abutments: Both abutments were cleared of trees and heavy brush and appeared to be in good condition. There was no evidence of seepage, erosion or slope instability anywhere on either abutment.

d. Principal Spillway:

(1) Intake Structure: The principal spillway intake structure was in good condition. There were no indications of serious rusting of the conduit or inlet ports and the concrete base slab contained no significant cracks or deterioration. The steel staircase had only minor surface rust.

Trash cages on the two lowest inlet ports were partially clogged with small debris and vegetal matter. However, the extent of clogging did not seem to be sufficient to significantly affect the performance of the intake structure.

(2) Control Structure: The principal spillway control structure was in good condition with no significant cracking or concrete deterioration observed. Steel components were either painted or had only minor surface rust.

The gate valve appeared to be in good condition, but was not activated (closed) to check its operability.

(3) Conduit: The conduit, as observed in the control structure, appeared to be in good condition.

(4) Outlet Structure: The principal spillway outlet structure appeared to be in good physical condition. No significant cracks or deterioration of the concrete were noted, although there was some minor spalling near the downstream edge of the outlet structure slab.

The grate covering the outlet structure was clogged with small debris and vegetal matter such that a six inch deep pool of water was standing behind the grate. Although significant pipe flows would probably disperse the debris, lower flows in the pipe were partially obstructed.

(5) Discharge Channel: The principal spillway discharge channel was lined with cobble-sized sandstone erosion protection for a distance of 10 feet below the outlet structure. Beyond this, the channel occupies an earth cut that is fully vegetated on both sides and bottom. There were no signs of significant erosion, sedimentation, or instability of the discharge channel.

The discharge channel extended for approximately 50 feet downstream where it entered the original valley drainage course. At this point, bedrock was exposed in the bottom of the creek channel.

e. Outlet Works: Silt Pond B does not have a low level outlet works facility because the impoundment zone is intended to collect and store sediment from the watershed above.

f. Emergency Spillway:

(1) Approach Channel: The emergency spillway approach channel contained considerable vegetal growth, including weeds and brush. However, there were no major obstructions that would reduce the capacity of the spillway during high flows.

(2) Overflow Crest: The broadcrested weir type overflow appeared to be functional although heavily vegetated. An elevation difference of 1.3 ft. across the control section was observed. The higher elevation was used in the analyses presented in Appendix D.

A wet, swampy area was observed in the region where the approach channel met the overflow crest. It could not be determined whether the wet conditions were the result of surface or subsurface drainage.

(3) Discharge Channel: The emergency spillway discharge channel appeared to have uniform slope and width and contained no obstructions that would reduce the discharge capacity of the spillway. Near the lower end of the discharge channel, bedrock was exposed at several places in the channel bottom.

The discharge channel directs spillway flows onto the original valley slope below the toe of the dam. No significant obstructions were observed at or immediately below the discharge channel outflow point.

(4) Channel Slope: Two small landslide zones were observed near the top of the right spillway side slope. Neither slough was large enough to imperil proper performance of the spillway.

g. Reservoir:

(1) Slopes: The slopes of the reservoir were observed to be generally moderate to steep and were completely vegetated with grass, brush and small trees.

No indications of significant slope instability or erosion were observed anywhere within the impoundment zone.

(2) Inlet Stream: The inlet stream approaches the reservoir through a natural creek channel which was heavily vegetated with brush and small trees.

(3) Sedimentation: None observed.

(4) Watershed: The watershed contributing to Silt Pond B is mostly undeveloped and consisted primarily of brush land. Some woodland was observed in the upper reaches and along the sides of the watershed.

At the head of the watershed, a disturbed area of approximately 1 acre was observed where a new garage was to be constructed by U. S. Steel.

A diversion ditch has been constructed around the entire perimeter of the watershed. The ditch discharges to the impoundment zone from both sides of the watershed immediately upstream of the dam.

h. Downstream Conditions:

(1) Channel: The downstream channel below Silt Pond B flows through an undeveloped valley for a distance of approximately 1,000 feet. The creek channel is natural and heavily vegetated with trees and brush. The channel passes beneath a township road via a 9 foot wide concrete box culvert. The culvert was silted to within 1 foot of the top of the opening. Immediately below, the channel passes through a 48 inch diameter concrete pipe and discharges directly to an 8 foot by 8 foot concrete box culvert beneath the Norfolk and Western Railroad tracks.

(2) Floodplain Conditions: In the 7,000 feet between Silt Pond B and Pigeon Creek, at least seven inhabited dwellings lie on the floodplain at elevations low enough to possibly be imperiled by high flows.

3.2 EVALUATION

The following evaluations are based on the results of the visual inspection performed on 4 December 1980.

a. Embankment: The condition of Silt Pond B embankment was good. Only minor deficiencies were observed during the inspection. These included:

(1) Some crest unevenness.

(2) A "barren area" on the central portion of the downstream slope that could not be identified.

(3) Unidentified flow in the lower right groin of the embankment.

b. Principal Spillway: The principal spillway appeared to be in good condition and functioning properly. Some clogging of the outlet structure grate was observed that appeared to be hindering conduit discharges for low flows.

Trash cages on the two lower inlet ports were partially clogged with debris and vegetation.

c. Emergency Spillway: The emergency spillway was in good condition with only minor deficiencies observed. These included:

(1) Two swampy areas in the spillway bottom near the overflow crest.

(2) Two small landslide zones near the top of the right spillway (cut) slope.

No obstructions were observed that would significantly reduce the capacity of the spillway during major flows.

d. Hazard Potential: Based on the observed downstream floodplain conditions, Silt Pond B was assigned a "high" hazard potential rating.

SECTION 4  
OPERATIONAL FEATURES

4.1 PROCEDURE

Reservoir pool level is maintained by the intake ports of the principal spillway. Normal operating procedure does not require a dam tender but periodic closure of the intake ports is required to maintain an acceptable discharge water quality. The principal spillway is controlled by a gate valve at the downstream toe of the embankment. Upstream control can be accomplished by closing the intake ports.

The emergency and principal spillways operate in an uncontrolled manner and do not require a dam tender.

4.2 MAINTENANCE OF DAM

The embankment and appurtenances are maintained by the United States Steel Corporation. Maintenance reportedly consists of periodically repairing eroded areas and making miscellaneous repairs as necessary.

4.3 INSPECTION OF DAM

The United States Steel Corporation is required by the State of Pennsylvania to inspect the dam annually and make needed repairs.

The United States Steel Corporation is required by the Mining Safety and Health Administration (MSHA) to inspect the dam at least once every seven days and to make an annual report and certification of the dam.

4.4 WARNING SYSTEM

There is no warning system and no formal emergency procedure to alert or evacuate downstream residents upon threat of a dam failure.

4.5 EVALUATION

The maintenance program should be continued. However, there are no written operation, maintenance or inspection procedures, nor is there a warning system or formal emergency procedure for this dam. These procedures should be developed in the form of checklists and step by step instructions, and should be implemented as necessary.

SECTION 5  
HYDROLOGY AND HYDRAULICS

**5.1 EVALUATION OF FEATURES**

a. Design Data: Silt Pond B has a watershed of 179 acres which is vegetated primarily by grass and brush-land. The watershed is about 4600 feet long and 2000 feet wide and has a maximum elevation of 1205 feet (MSL). At maximum normal pool, the dam impounds a reservoir with a surface area of about 4.8 acres and a storage volume of 35 acre-feet. Maximum normal pool level is maintained at Elevation 1038.2 by the overflow crest of the emergency spillway. The impoundment has a principal spillway conduit with an upstream invert at Elevation 1005.0. For the purpose of this hydrologic analysis, the principal spillway was assumed to be inoperative.

Design spillway capacity and embankment freeboard were made sufficient to accommodate 1500 cubic feet per second per square mile which was considered sufficient for this structure and watershed at the time of design. Silt Pond B's actual spillway capacity for the observed cross-section and existing freeboard condition was computed to be 1706 cfs.

No additional hydrologic calculations were found relating reservoir/spillway performance to the Probable Maximum Flood or fractions thereof.

b. Experience Data: Records are not kept of reservoir level or rainfall amounts. There is no record or report of the embankment ever being overtopped.

c. Visual Observations: On the date of the field inspection, no serious deficiencies were observed that would prevent the principal or emergency spillways from functioning. The water level at the time of the field inspection was observed to be 22.1 feet below the emergency spillway crest. The owner's representative reported that the water level observed was the normal operating pool level and that it has remained at that elevation for some time.

d. Overtopping Potential: Overtopping potential was investigated through the development of the Probable Maximum Flood (PMF) for the watershed and the subsequent routing of the PMF and fractions of the PMF through the reservoir and spillway. The Corps of Engineers guidelines recommends the Probable Maximum Flood for "intermediate" size, "high" hazard dams. Therefore the Spillway Design Flood (SDF) is the PMF.

Hydrometeorological Report No. 33 indicates the adjusted 24 hour Probable Maximum Precipitation (PMP) for the subject site is 19.4 inches. No calculations were found that related the reservoir/spillway system to a PMP type precipitation event. Consequently, an evaluation of the system was performed to determine whether or not the dam's spillway capacity is adequate under current Corps of Engineers' guidelines.

The Corps of Engineers, Baltimore District, has directed that the HEC-1 Dam Safety Version computer program be utilized. The program was prepared by the Hydrologic Engineering Center (HEC), U.S. Army Corps of Engineers, Davis, California, July 1978. The major methodologies and key input data for this program are discussed briefly in Appendix D.

The peak inflow to Silt Pond B was determined by HEC-1 to be 760 cfs for the SDF.

An initial pool elevation of 1038.2 was assumed prior to commencement of the storm.

e. Spillway Adequacy: The capacity of the combined reservoir and spillway system was determined to be in excess of the PMF by HEC-1. According to Corps of Engineers' guidelines, Silt Pond B's spillway is "adequate."

## SECTION 6 STRUCTURAL STABILITY

### 6.1 AVAILABLE INFORMATION

- a. Design and Construction Data: All available design documentation, calculations and other data received from the Pennsylvania Department of Environmental Resources were reviewed. This data is discussed in Section 2 and a detailed listing is included in Appendix B. The owner provided the drawings that are presented in Appendix E.
- b. Operating Records: There are no written operating records or procedures for this dam.
- c. Post Construction Changes: There are no reported post construction modifications to the embankment.
- d. Visual Observations:

(1) Embankment: Visual observations made during the field inspection did not indicate evidence of a high ground water level in the embankment. A wet zone was observed near the center of the downstream slope, approximately on the line of the principal spillway conduit. The area was quite muddy and underlying coal refuse was exposed. The origin of the water could not be determined, but field measurements indicated the area was approximately 6 feet above the pool of the reservoir.

A flow of water, estimated at 5 gpm, was observed in and beneath the erosion protection blanket in the lower right groin of the embankment.

The downstream slope was generally uniform and contained a heavy vegetal cover of Crownvetch. There were no observed indications of erosion or instability of the downstream slope.

(2) Outlet Facilities: Observations of visible components of the principal spillway gave no indication of instability.

(3) Emergency Spillway: Observation of the emergency spillway gave no indication of significant instability. Two small landslides were noted at the top of the spillway cut slope.

e. Performance: There has been no indication or report of any problems with the performance of this embankment over its three-year life.

## 6.2 EVALUATION

a. Design Documents: The design documentation was, by itself, considered inadequate to evaluate the structure.

The stability analysis performed for this embankment utilized the "friction circle" method of analysis. All parameters were assumed either from text books or from an analysis performed on a nearby embankment. The calculations conclude "The relationship of developed cohesion to maximum cohesion gives a safety factor of 2.91". Analyses were not found concerning the end of construction steady seepage nor earthquake loadings.

b. Embankment: Based on the visual observations of embankment slopes, materials, seepage and ground water conditions, Silt Pond B appeared to have an adequate margin of safety against sliding.

c. Spillways: Based on the visual observations, the principal and emergency spillway structures for Silt Pond B appeared to be stable.

d. Seismic Stability: According to the Seismic Risk Map of the United States, Silt Pond B is located in Zone 1 where damage due to earthquakes would most likely be minor.

A dam located in Seismic Zone 1 may be assumed to present no hazard from an earthquake provided static stability conditions are satisfactory and conventional safety margins exist. However, no calculations were developed to verify this assessment.

SECTION 7  
ASSESSMENT AND RECOMMENDATIONS

7.1 ASSESSMENT

a. Evaluation:

(1) Embankment: Silt Pond B's embankment is considered to be in good condition. This is based on visual observations that revealed only minor deficiencies.

(2) Principal Spillway: The condition of the principal spillway is considered to be good. The facility was observed to have only minor deficiencies and appeared to be functioning properly.

(3) Emergency Spillway: The condition of the emergency spillway is considered to be good. This is based on its "adequate" capacity rating determined using the HEC-1 computer program and its observed satisfactory physical condition.

(4) Emergency Plans: The lack of a documented emergency operation and warning plan is considered to be a deficiency.

b. Adequacy of Information: The information available on design, construction, operation and performance history in combination with visual observations and hydrology and hydraulic calculations was sufficient to evaluate the embankment and appurtenant structures in accordance with the Phase I investigation guidelines.

c. Urgency: The recommendations presented in Section 7.2a and 7.2b should be implemented immediately.

d. Necessity for Additional Studies: None.

7.2 RECOMMENDATIONS

a. Emergency Operation and Warning Plan: The owner should develop an Emergency Operation and Warning Plan including:

(1) Guidelines for evaluating inflow during periods of heavy precipitation or runoff.

(2) Procedures for around the clock surveillance during periods of heavy precipitation or runoff.

(3) Procedures for removal of standing water in the reservoir under emergency conditions.

(4) Procedures for notifying downstream residents and public officials, in case evacuation of downstream areas is necessary.

b. Remedial Work: The Phase I investigation of Silt Pond B disclosed several minor deficiencies which should be corrected. The recommended remedial work should include:

(1) Repair of the wet zone on the downstream slope;

(2) Repair of the landslides on the emergency spillway cut slope; and

(3) Removal of debris from the trash cages on the active intake port and outlet structures.

Also, the origin of the flowing water in the lower right groin should be determined and corrective measures taken, if required.

APPENDIX A  
VISUAL INSPECTION CHECKLIST

VISUAL OBSERVATIONS CHECKLIST I  
(NON-MASONRY IMPOUNDING STRUCTURE)

Name	Dam	Silt Pond	B	County	<u>Washington</u>	State	<u>Pennsylvania</u>	National ID #	<u>PA00824</u>
Type of Dam	Earth				Hazard Category	<u>High</u>			
Date(s) Inspection	<u>4 December 1980</u>			Weather	<u>Partly cloudy, cool</u>		Temperature	<u>45°F</u>	
Pool Elevation at Time of Inspection	<u>1016.1</u>		(MSL)	Tailwater at Time of Inspection	<u>1000</u>	<u>+</u>	(MSL)		

Inspection Personnel: J. E. Barrick, P.E. Ackenheil & Associates, Project Manager

and Hydrologist  
Ackenheil & Associates, Geotechnical Engineer  
S. G. Mazzella  
Ackenheil & Associates, Civil Engineer  
J. D. Floris  
U. S. Steel Corporation, Owner's Representative  
C. A. Woodward  
Pennsylvania Department of Environmental Resources

Recorder J. E. Barrick

GEO Project G80138-D  
PennDER I.D. No. 63-77

EMBANKMENT

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
SURFACE CRACKS	None observed.	A wet zone was observed about midway down the embankment's downstream slope approximately on the line of the outlet works conduit. The area was barren and muddy but gave no indication of continuous seepage flows. Field measurements indicated that the area in question was approximately six feet above the reservoir pool elevation.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES		Two small slough zones were observed at the top of the emergency spillway's right (cut) slope. The slough lengths were approximately 20 and 30 feet, respectively. No other indications of instability of embankment or abutment slopes were observed.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST		The embankment crest was straight and approximately level throughout the right central portion of the embankment. A noticeable depression of the left central portion of the crest was observed. Near the left abutment the crest rose slightly and approached a diversion ditch excavated into the abutment. At the right end of the embankment, the upstream side of the crest dropped slightly toward the emergency spillway.

EMBANKMENT (CONTINUED)

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
RIPRAP FAILURES	None observed.	
SETTLEMENT	See "Vertical and Horizontal Alignment of the Crest" above.	
JUNCTION OF EMBANKMENT AND ABUTMENT	No erosion or indications of instability were observed in the vicinity of the junction of the embankment and the abutment.	
JUNCTION OF EMBANKMENT AND SPILLWAY	No seepage, erosion or indications of instability were observed anywhere along the junction of the embankment and the emergency spillway.	
ANY NOTICEABLE SEEPAGE	The barren spot observed near the center of the embank- ment's downstream slope was wet and muddy. It could not be determined if the origin of the moisture was surficial or subsurface.	
	A flow of water was observed in the lower right groin area flowing through and beneath the stone erosion protec- tion. The flow was estimated at approximately 5 gallons per minute and the origin could not be determined because of the erosion protection blanket and heavy vegetation.	
STAFF GAUGE AND RECORDER	None observed.	
DRAINS	None observed.	

EMBANKMENT (CONTINUED)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFICIAL CONDITIONS	<p>The embankment crest was covered with gravel-size sandstone fragments for the entire width and length. The gravel covering appeared to be generally uniform and contained a considerable amount of vegetal growth.</p> <p>The lower portion of the embankment's upstream slope was covered with a blanket of cobble-sized sandstone erosion protection. The erosion protection blanket approached to within approximately 5 feet of the embankment crest and contained considerable vegetation growing through. Above the blanket, the embankment slope was generally uniform and completely covered with vegetation (Crownvetch).</p> <p>The lower portion of the downstream slope was covered with a cobble-sized sandstone erosion protection blanket which extended down into the toe drain channel. The blanket appeared to be generally uniform and contained a considerable amount of vegetal growth. Above the blanket, the downstream slope was generally uniform and completely covered with vegetation except in the wet zone described in "Surface Cracks" above.</p>	

PRINCIPAL SPILLWAY

VISUAL EXAMINATION OF      OBSERVATIONS      REMARKS OR RECOMMENDATIONS

INTAKE STRUCTURE

The principal spillway intake structure was in good physical condition. The inlet ports were not heavily rusted and appeared to be operational.

The trash cage on the lowest inlet port was partially clogged by debris. The concrete slab foundation had no major cracks or evidences of concrete deterioration.

The steel staircase access to the inlet ports was in good condition with only minor surface rust observed.

CONTROL STRUCTURE

The principal spillway control structure was in good condition. No significant cracks or deterioration of concrete walls were observed and steel components contained only superficial rust.

The gate valve control was not activated, and appeared to be in good condition.

CONDUIT

The only visible portion of the principal spillway conduit was at the control structure at the downstream toe. The conduit appeared to be in good condition.

OUTLET STRUCTURE

The principal spillway outlet structure appeared to be in good condition. No significant cracking was observed in the concrete headwall, wingwalls or slab structure. Some minor deterioration of the concrete was observed at the downstream end of the slab. The steel grate appeared to be in good condition.

PRINCIPAL SPILLWAY (CONTINUED)

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
OUTLET STRUCTURE (continued)	The lower portion of the grate was partially clogged by vegetal growth. The obstruction did not appear to seriously hinder the conduit's performance although water was standing to a depth of about six inches behind the grate.	
DISCHARGE CHANNEL	The principal spillway discharge channel immediately below the outlet structure was lined with cobble-sized sandstone erosion protection for about ten feet. Below this, the channel was in natural ground with vegetated sides. No serious erosion or sedimentation was observed at or below the outlet structure.	
EMERGENCY GATE	None observed.	

EMERGENCY SPILLWAY

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
APPROACH CHANNEL	The emergency spillway approach channel was clear of major obstructions although it contained considerable brush-type vegetal growth. The capacity of the spillway did not appear to be significantly affected by this growth.	Two wet, swampy areas were noted in the approach channel near and just upstream of the embankment crest. Some cattail growth was observed.
OVERFLOW SECTION		The emergency spillway overflow section occurs approximately at the crest of the embankment where there is a relatively flat area in the spillway bottom.
DISCHARGE CHANNEL		The emergency spillway discharge channel was unobstructed although it contained considerable brush-type vegetal growth. The capacity of the spillway did not appear to be significantly affected by this growth. In the lower portion of the discharge channel, bedrock was exposed in the spillway bottom.

INSTRUMENTATION

VISUAL EXAMINATION OF                   OBSERVATIONS                   REMARKS OR RECOMMENDATIONS

MONUMENTATION/SURVEYS

None observed.

WEIRS

None observed.

PIEZOMETERS

None observed.

OBSERVATION WELLS

None observed.

RESERVOIR

VISUAL EXAMINATION OF  
OBSERVATIONS

- The reservoir slopes were moderately steep and were grass or brush covered. There were no signs of significant slope instability anywhere within the limits of the impoundment.
- None observed.
- The inlet stream approaches the impoundment area through a natural, grass and brush lined channel.

IMPLEMENTATION  
NOTES

On the date of inspection, the watershed for Silt Pond B was completely undeveloped, and generally grass and brush covered although there were patches of woods in the upper reach of the watershed. At the upper end of the watershed, there was a disturbed area, of approximately 1 acre, where a garage was to be erected.

DOWNSTREAM CHANNEL

INITIAL EXAMINATION OF      OBSERVATIONS      REMARKS OR RECOMMENDATIONS

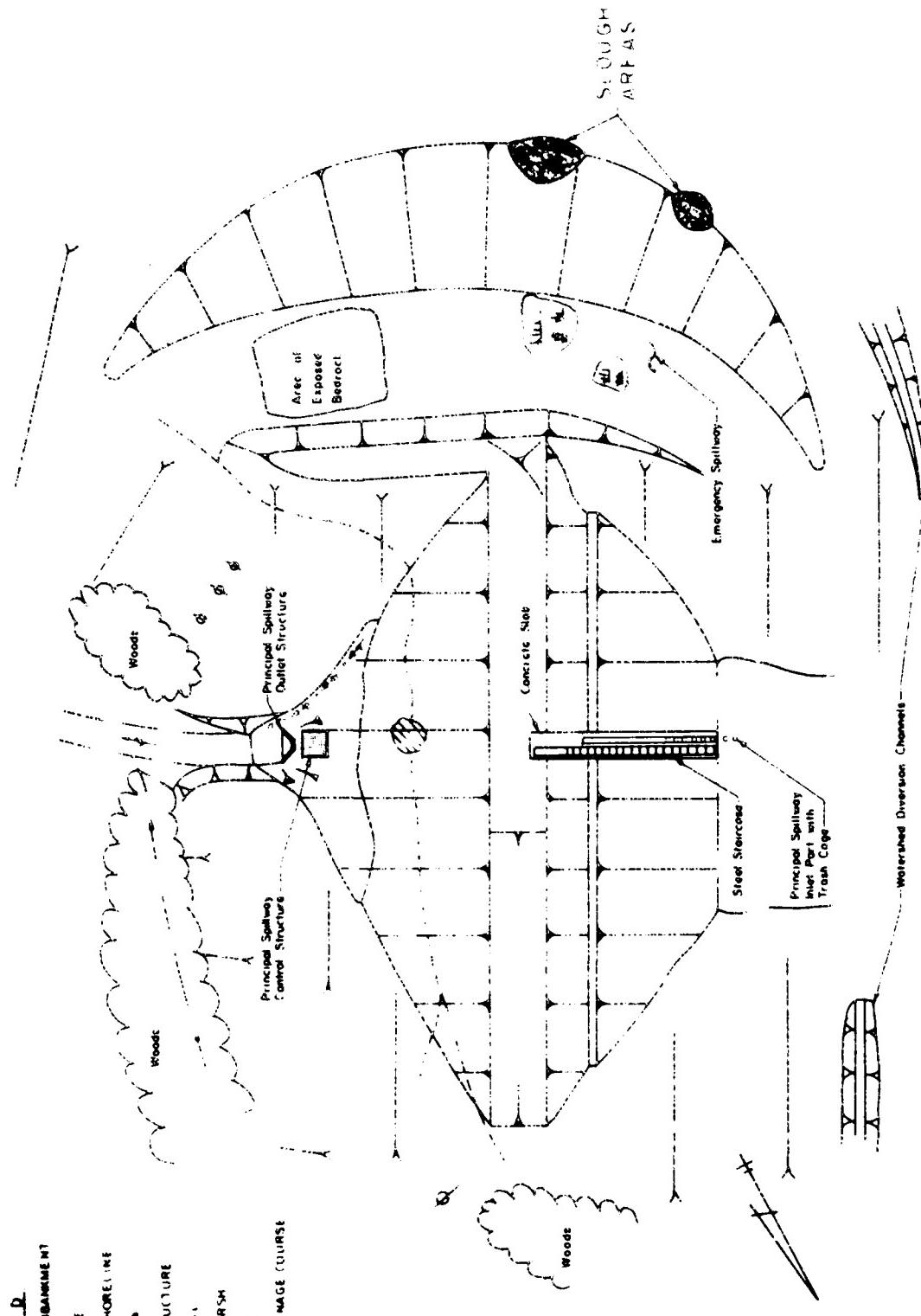
NATURAL  
CONDITIONS,  
SIGHT, FT.  
The principal spillway discharge channel flows into the original creek channel which flows for 1,000 feet through an uninhabited, undeveloped valley. The creek passes beneath a township road via a 9 foot wide box culvert which is silted to within 1 foot of the top of the opening. Below this, the creek passes through a 48 inch diameter concrete pipe and immediately enters an 8 foot by 8 foot concrete box culvert beneath the Norfolk and Western Railroad tracks.

APPROXIMATE NUMBER  
OF HOMES AND POPULATION

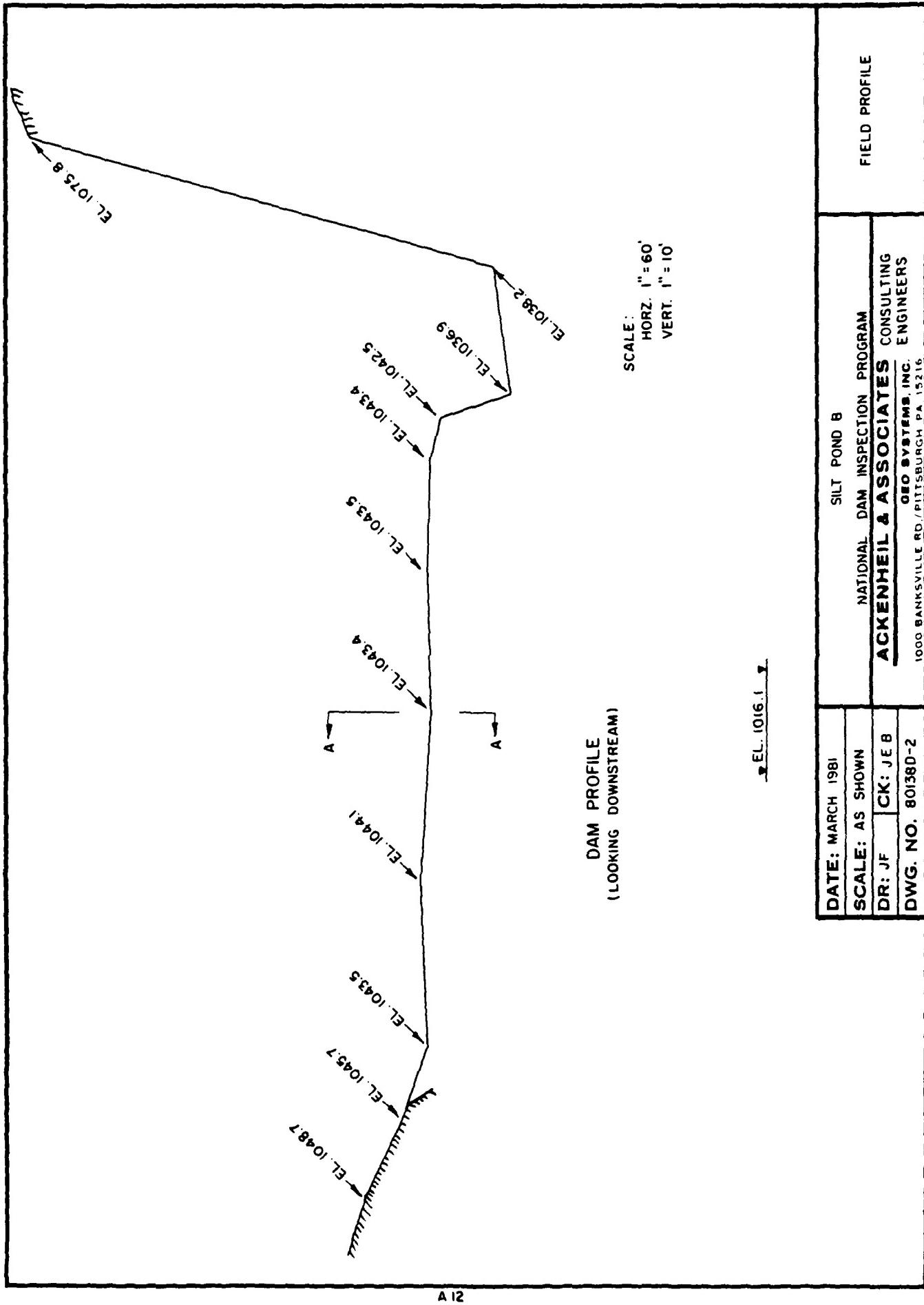
In the reach between Silt Pond B and Pigeon Creek (a distance of approximately 7,000 feet) there are at least seven inhabited dwellings on the floodplain at elevations low enough to possibly be imperiled by high flows.

**LEGEND**

- IMPOUNDING EMBANKMENT
- SLIDE OFF
- OTHER SLOPES
- BREAK OR SHORELINE
- BURROW AREA
- CONCRETE STRUCTURE
- PIPES OR TANKS
- SWAMP OR MARSH
- DITCH OR GULF
- SURFACE DRAGEAGE COURSE



<b>DATE:</b> MARCH 1981	NATIONAL DAM INSPECTION PROGRAM		
<b>SCALE:</b> NONE	<b>ACKENHEIL &amp; ASSOCIATES</b> CONSULTING		
DR: J F	CK: JEB	<b>GEO SYSTEMS, INC.</b>	ENGINEERS
DWG. NO. 80138D-1		1000 BANKSVILLE RD.	PITTSBURGH PA 15216

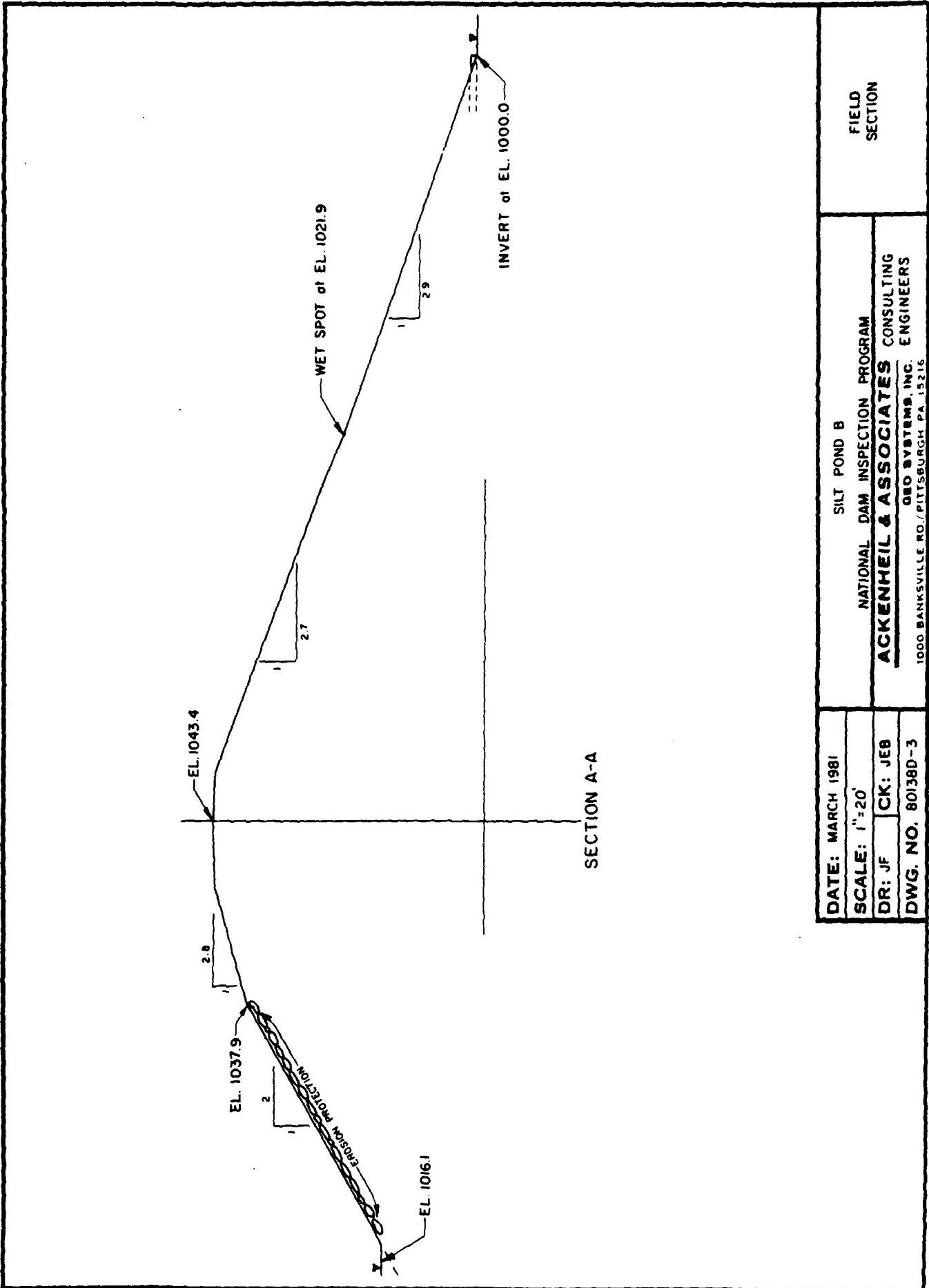


SCALE:  
HORZ. 1" = 60'  
VERT. 1" = 10'

DAM PROFILE  
(LOOKING DOWNSTREAM)

EL. 1016.1

DATE: MARCH 1981		SILT POND B		FIELD PROFILE	
SCALE: AS SHOWN		NATIONAL DAM INSPECTION PROGRAM			
DR: JF	CK: JEB	<b>ACKENHEIL &amp; ASSOCIATES</b>		CONSULTING	ENGINEERS
DWG. NO. 80138D-2		1000 BANKSVILLE RD./PITTSBURGH PA 15216	OEO SYSTEMS, INC.		



A13

DATE: MARCH 1981	SILT POND B	FIELD SECTION
SCALE: 1"=20'	NATIONAL DAM INSPECTION PROGRAM	
DR: JF	<u>ACKENHEIL &amp; ASSOCIATES</u> CONSULTING	
DWG. NO. 80138D-3	GEO SYSTEMS, INC.	ENGINEERS
	1000 BANKSVILLE RD. PITTSBURGH PA 15216	

1/13 9:45 AM 1981 BY DRAFTSPERSON AND CIVIL ENGINEER DR: JF

APPENDIX B  
ENGINEERING DATA CHECKLIST

CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION  
PHASE I

NAME OF DAM Silt Pond B  
NDI No.: PA 00824

ITEM	REMARKS
**Design Drawings	Drawing 52-A-9A Sheet 1, Ginger Hill Refuse Area #2, dated 8/3/76
	Drawing 73-Q-26 Sheet No. 29, Typical Embankment Section and Plan of Decant Location, dated 9/13/76 with revisions 5/21/77 and 6/1/77
	Drawing 73-Q-26 Sheet No. 38, North Pond Spillway and Details, dated 11/11/76 with revision 3/24/77
	Drawing 73-Q-26 Sheet No. 40, Typical Embankment Sections, dated 10/20/76 with revision 3/31/77
**As-Built Drawings	See Design Drawings above.
Regional Vicinity Map	U.S.G.S. 7-1/2 minute Monongahela, Pennsylvania Quadrangle Map.
*Construction History	Constructed by Great Lakes Construction Company between February 1977 and 31 October 1977.
**Typical Sections of Dam	See Design Drawings above.

ITEM	REMARKS
**Outlets-Plan Details Constraints Discharge Ratings	See Design Drawings above.
Rain/Reservoir Records	None available.
*Design Reports	"Report on the Application of the United States Steel Corporation" undated, by the Chief Dams Section, Division of Dams and Encroachments, Pennsylvania Department of Environmental Resources.
Geology Reports	None available.
*Design Computations	See Hydrology and Hydraulics and Dam Stability below. B2
*Hydrology and Hydraulics	Spillway design calculations by H. G. Spaw of the U. S. Steel Corporation.
*Dam Stability	Embankment stability calculations by H. G. Spaw of the U. S. Steel Corporation.
Seepage Studies	None available.
Materials Investigations, Borings Records, Laboratory, Field	None available.

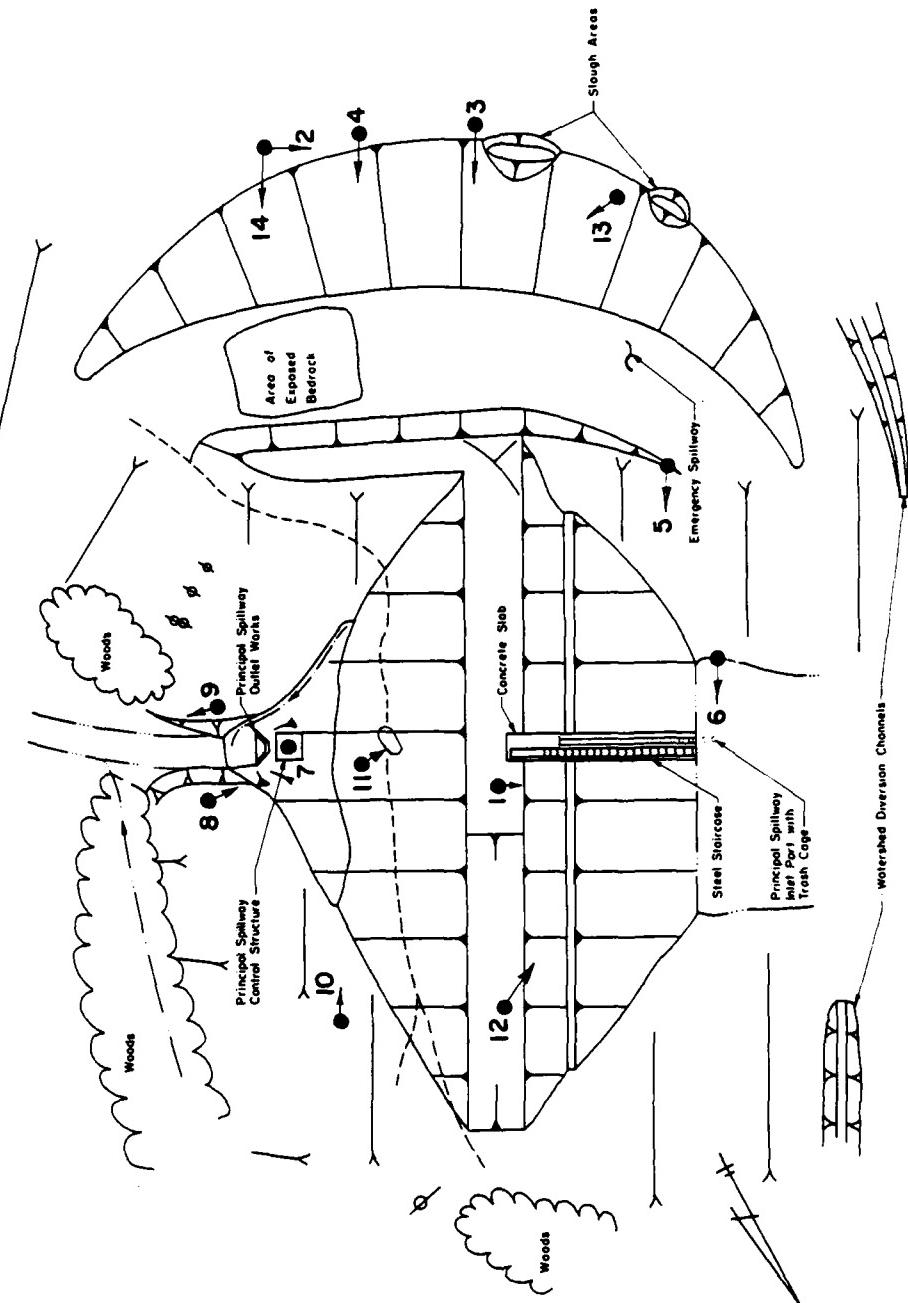
ITEM	REMARKS
Post-Construction Surveys of Dam	None available.
Borrow Sources	None reported.
Monitoring Systems	None reported.
Modifications	None reported.
High Pool Records	None available.
Post-Construction Engineering Studies and Reports	None available.
Maintenance, Operation, Records	None available.
**Spillway - Plan Sections Details	See Design Drawings above.
Operating Equipment Plans and Details	None available.
**Specifications	
"United States Steel Corporation-Raw Materials and Lake Shipping-Frick District-Specification No. 193-6232-5 Refuse Disposal Area II at Maple Creek Mine", dated 16 November 1976.	

ITEM	REMARKS
Construction Reports	None available.
Prior Accidents or Failure of Dam Reports	None reported.
*Miscellaneous	<p>"Application for Encroachment Permit" to the Program Services Section, Bureau of Water Quality Management, dated 21 May 1973.</p> <p>Miscellaneous correspondence between local residents and the Bureau of Water Quality Management relating to permit status.</p> <p>"Permit" to United States Steel Corporation to construct two desilting basins on tributaries to Pigeon Creek, dated 22 June 1973.</p> <p>Correspondence between U. S. Steel Corporation and PennDER Division of Dams and Encroachments relating to dam design requirements.</p> <p>"Permit" to United States Steel Corporation to construct and maintain two dams across an unnamed tributary to Pigeon Creek . . . , dated 19 November 1973.</p> <p>Miscellaneous correspondence between PennDER and U. S. Steel Corporation related to permit revisions and dam construction.</p> <p>"Dam Completion Report", by R. R. Godard, Chief Engineer, Frick District, U. S. Steel Corporation, dated 4 November 1977.</p>

\*Information and data may be obtained from the PennDER, Harrisburg, Pennsylvania.  
 \*\*Information provided by U. S. Steel Corporation.

APPENDIX C  
PHOTOGRAPHS

PHOTO LOCATIONS 15 AND  
16 ARE NOT SHOWN



DATE: MARCH 1981	SILT POND B	NATIONAL DAM INSPECTION PROGRAM	PHOTO KEY MAP
SCALE: NONE			
DR: JF	CK:	A. C. ACKENHEIL & ASSOCIATES, INC.	
DWG. NO. 801360		PITTSBURGH, PA. CONSULTING ENGINEERS CHARLESTON, W. VA. & BALTIMORE, MD.	PA 112-391

SILT POND 8



SITE POND B





SITE POND B



### PHOTOGRAPH DESCRIPTIONS

- Photo 1 Reservoir Overview from embankment crest.
- Photo 2 Reservoir Overview showing emergency spillway channel.
- Photo 3 Embankment Crest
- Photo 4 Downstream Slope
- Photo 5 Upstream Slope and Principal Spillway Intake Structure
- Photo 6 Principal Spillway Intake Structure showing trash rack, intake ports and access stairway.
- Photo 7 Principal Spillway Control Valve and Handwheel
- Photo 8 Principal Spillway Control and Outlet Structures
- Photo 9 Principal Spillway Discharge Channel
- Photo 10 Downstream Slope and Principal Spillway Control Structure. Note wet zone in center of photo.
- Photo 11 Close-Up of Wet Zone
- Photo 12 Emergency Spillway Entrance
- Photo 13 Emergency Spillway Discharge Channel showing swampy area in channel.
- Photo 14 Utility Poles beyond downstream embankment toe. Emergency spillway discharge channel in foreground.
- Photo 15 Downstream Hazards
- Photo 16 Downstream Hazard

APPENDIX D  
HYDROLOGY AND HYDRAULICS  
ANALYSES

APPENDIX D  
HYDROLOGY AND HYDRAULICS ANALYSES

Methodology: The dam overtopping analysis was accomplished using the systemized computer program HEC-1 (Dam Safety Version), July 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. A brief description of the methodology used in the analysis is presented below.

1. Precipitation: The Probable Maximum Precipitation (PMP) is derived and determined from regional charts prepared from past rainfall records including "Hydrometeorological Report No. 33" prepared by the U.S. Weather Bureau.

The index rainfall is reduced from 10% to 20% depending on watershed size by utilization of what is termed the HOP Brook adjustment factor. Distribution of the total rainfall is made by the computer program using distribution methods developed by the Corps.

2. Inflow Hydrograph: The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for reservoir routing.

The unit hydrograph is developed using the Snyder method. This method requires calculation of several key parameters. The following list gives these parameters, their definition and how they were obtained for these analyses.

<u>Parameter</u>	<u>Definition</u>	<u>Where Obtained</u>
Ct	Coefficient representing variations of watershed	From Corps of Engineers*
L	Length of main stream channel	From U.S.G.S. 7.5 minute topographic map
Lca	Length on main stream to centroid of watershed	From U.S.G.S. 7.5 minute topographic map
Cp	Peaking coefficient	From Corps of Engineers*
A	Watershed size	From U.S.G.S. 7.5 minute topographic map

3. Routing: Reservoir routing is accomplished by using Modified Puls routing techniques where the flood hydrograph is routed through reservoir storage. Hydraulic capacities of the outlet works, spillways and the crest of the dam are used as outlet controls in the routing.

The hydraulic capacity of the outlet works can either be calculated and input or sufficient dimensions input and the program will calculate an elevation-discharge relationship.

Storage in the pool area is defined by an area-elevation relationship from which the computer calculates storage. Surface areas are either planimetered from available mapping or U.S.G.S. 7.5 minute series topographic maps or taken from reasonably accurate design data.

4. Dam Overtopping: Using given percentages of the PMF the computer program will calculate the percentage of the PMF which can be controlled by the reservoir and spillway without the dam overtopping.

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\*Developed by the Corps of Engineers on a regional basis for Pennsylvania.

HYDROLOGIC AND HYDRAULIC  
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Predominately grass and brushland. No major development noted.

ELEVATION-TOP NORMAL POOL (STORAGE CAPACITY): Varies (varies) (1038.2 maximum) (35 acre-feet)

ELEVATION-TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1042.5 (60 acre-feet)

ELEVATION-MAXIMUM DESIGN POOL: 1042.0

ELEVATION-TOP DAM: 1042.5 (minimum) 1043.4 (average)

OVERFLOW SECTION

- a. Elevation 1036.9 to 1038.2 (Use 1038.2)
- b. Type Trapezoidal Open Channel
- c. Width 61.9 feet
- d. Length 30 feet
- e. Location Spillover Right Abutment
- f. Number and Type of Gates None

OUTLET WORKS (Principal Spillway)

- a. Type 16 inch diameter stainless steel pipe
- b. Location Near centerline of dam
- c. Entrance Invert Varies
- d. Exit Inverts 1000.0
- e. Emergency Drawdown Facilities None

HYDROMETEOROLOGICAL GAGES

- a. Type None
- b. Location N/A
- c. Records None

MAXIMUM REPORTED NON-DAMAGING  
DISCHARGE None reported

HEC-1 DAM SAFETY VERSION  
HYDROLOGY AND HYDRAULIC ANALYSIS  
DATA BASE

NAME OF DAM:	Silt Pond B	NDI NO. PA	00824
Probable Maximum Precipitation (PMP)			24.2*
Drainage Area "Zone 7"		0.28 sq. mi.	
Reduction of PMP Rainfall for Data Fit Reduce by 20%, therefore PMP rainfall		0.8 (24.2) = 19.4 inches	
Adjustments of PMF for Drainage Area			
6 hrs.		102%	
12 hrs.		120%	
24 hrs.		130%	
48 hrs.		140%	
Snyder Unit Hydrograph Parameters			
Zone		29**	
$C_p$		0.5	
$C_t$		1.6	
$L$		0.95 mile	
$L_{ca}$		0.57 mile	
$t_p = C_t (L + L_{ca})^{0.3} =$		1.33 h. hrs	
Loss Rates			
Initial Loss		1.0 inch	
Constant Loss Rate		0.05 inch/hour	
Base Flow Generation Parameters			
Flow at Start of Storm		1.5 cfs/sq.mi=0.42 cfs	
Base Flow Cutoff		0.05 x Q peak	
Recession Ratio		2.0	
Overflow Section Data			
Crest Length		61.9 feet	
Freeboard		4.3 feet	
Discharge Coefficient		3.09	
Exponent		1.5	
Discharge Capacity		1706 cfs	

\* Hydrometeorological Report 33

\*\*Hydrological zone defined by Corps of Engineers,  
Baltimore District, for determining Snyder's Coefficients  
( $C_p$  and  $C_t$ ).

ACKENHEIL & ASSOCIATES  
GEO Systems, Inc.  
1000 Banksville Road  
PITTSBURGH, PA 15216  
(412) 531-7111

Sheet \_\_\_\_\_ of \_\_\_\_\_  
Job MAPLE Creek Refuse II Pond B Job No 801381D  
Subject DATA Input  
Made By JPH Date 11/70/80 Checked JEB Date 2/26/81

### Loss Rate and Base Flow Parameters

As recommended by Corps of Engineers Baltimore District

STRL	= 1 inch
CNSTL	= 0.05 in/in
STRLQ	= 1.5 cfs/in.
QRCMN	= 0.05 (5% of Peak Flow)
RT10rc	= 2.0

### ELEVATION - AREA - CAPACITY - RELATIONSHIPS

From USGS 7.5min Quad, Penn Dev files and field impound data

AT elevation	1042
Initial Storage	56.8 Acre-Ft
Pond Surface area	6.6 Acres
AT elevation	Area =
1050	14 Acres

From Curve Method of Reservoir Volume

Flood Hydrograph Package (HEC-1)

Dam Safety Version (Users manual)

$$H = 3V/A = \frac{3(56.8)}{6.6} = 25.8$$

Elevation where Area equals zero =

$$1042 - 25.8 = 1016.2$$

\$A	0.	6.6	14.0
\$E	1016.2	1042.	1050.

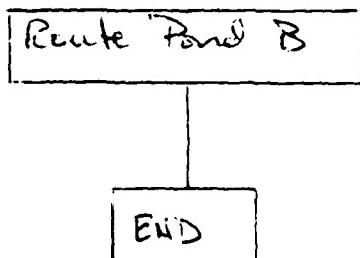
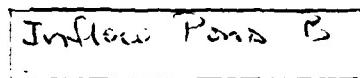
ACKENHEIL & ASSOCIATES  
GEO Systems, Inc.  
1000 Banksville Road  
PITTSBURGH, PA 15216  
(412) 531-7111

Sheet \_\_\_\_\_ of \_\_\_\_\_  
Job Maple Creek Release at Pond B Job No SC138.D  
Subject Data Input  
Mode By JBT Date 11/20/80 Checked FB Date 2/26/81

### Overtop Parameters

Top of Dam Elevation (maximum) = 1042.5  
Length of Dam = 350 feet  
Coefficient of Discharge. = 3.09

### Program Schedule



\*\*\*\*\*  
FLOOD HYDROGRAPH PACKAGE (HEC-1)  
DAM SAFETY VERSION JULY 1978  
LAST MODIFICATION 26 FEB 79  
\*\*\*\*\*

1 A1 NATIONAL PROGRAM FOR THE INSPECTION OF NON FEDERAL DAMS  
2 A2 HYDROLOGIC AND HYDRAULIC ANALYSIS OF REFUSE AREA II SILT POND B  
3 A3 PROBABLE MAXIMUM FLOOD PMF/UNIT HYDROGRAPH BY SNYDER'S METHOD  
4 B 300 0 10 0 0 0 0 0 -4 0  
5 B1 -  
6 J 1 3 1  
7 J1 1. .5 .4  
8 K 0 1 1  
9 K1 INFLOW HYDROGRAPH FOR REFUSE AREA II SILT POND B 1  
10 M 1 1 0.28 0.28 1  
11 P 24.2 102 120 130 140  
12 T 1.0 .05  
13 W 1.33 0.50  
14 X -1.5 -0.05 2.0  
15 K 1 2 1  
16 K1 ROUTING AT REFUSE AREA II SILT POND B  
17 Y 1 1 -1038.2  
18 Y1 1  
19 \$A 0. 6.6 14.  
20 \$E1016.2 1042. 1050.  
21 \$S1038.2 61.9 3.09 1.5  
22 \$D1042.5 3.09 1.5 350.  
23 \$L 2. 20. 215. 322. 330. 339. 347. 356. 395.  
24 \$V1042.5 1043.0 1043.5 1044.0 1044.5 1045.0 1045.5 1046.0 1049.0  
25 K 99  
26 A  
27 A  
28 A  
29 A  
30 A

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT 1  
ROUTE HYDROGRAPH TO 2  
END OF NETWORK

\*\*\*\*\*  
FLOOD HYDROGRAPH PACKAGE (HEC-1)  
DAM SAFETY VERSION JULY 1978  
LAST MODIFICATION 26 FEB 79  
\*\*\*\*\*

RUN DATE: 7 JAN 81  
RUN TIME: 9.18.30

NATIONAL PROGRAM FOR THE INSPECTION OF NON FEDERAL DAMS  
HYDROLOGIC AND HYDRAULIC ANALYSIS OF REFUSE AREA II SILT POND B  
PROBABLE MAXIMUM FLOOD PMF/UNIT HYDROGRAPH BY SNYDER'S METHOD

JOB SPECIFICATION										
NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN	
300	0	10	0	0	0	0	0	-4	0	
	JOPER			NWT	LROPT	TRACE				
				5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED  
NPLAN= 1 NRTIO= 3 LRTIO= 1  
RTIOS= 1.00 0.50 0.40

SUB-AREA RUNOFF COMPUTATION  
INFLOW HYDROGRAPH FOR REFUSE AREA II SILT POND B

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	I NAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA									
IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	0.28	0.0	0.28	0.0	0.0	0	1	0

PRECIP DATA									
SPFE	PMS	R6	R12	R24	R48	R72	R96		
0.0	24.20	102.00	120.00	130.00	140.00	0.0	0.0		

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA										
LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRIL	CNSTL	ALSMX	RTIMP
0	0.0	0.0	1.00	0.0	0.0	1.00	1.00	0.05	0.0	0.0

UNIT HYDROGRAPH DATA									
TP=	1.33	CP=0.50	NTA=	0					

RECEDITION DATA									
STRIQ=	-1.50	QRCSN=	-0.05	RTIOR=	2.00				

UNIT HYDROGRAPH 62 END-OF-PERIOD ORDINATES, LAG= 1.34 HOURS, CP= 0.50 VOL= 1.00									
3.	10.	20.	32.	45.	56.	64.	69.	68.	63.
58.	53.	48.	44.	40.	36.	33.	30.	28.	25.
23.	21.	19.	17.	16.	14.	13.	12.	11.	10.
9.	8.	8.	7.	6.	6.	5.	5.	4.	4.
4.	3.	3.	3.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.								

END-OF-PERIOD FLOW													
MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
							SUM	27.10	24.68	2.42	26485.		
							( 688.)	( 627.)	( 61.)	( 749.97)			

HYDROGRAPH ROUTING

ROUTING AT REFUSE AREA II SILT POND B

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	I NAME	ISTAGE	IAUTO	
2	1	0	0	0	0	1	0	0	
ROUTING DATA									
QLOSS	CLOSS	Avg	IRES	ISAME	IOPT	IPMP		LSTR	
0.0	0.0	0.0	1	1	0	0		0	
NSTPS	NSTDL		LAG	AMSKK	X	TSK	STORA	ISPRAT	
1	0		0	0.0	0.0	0.0	-1038.	0	

SURFACE AREA= 0. 7. 14.

CAPACITY= 0. 57. 137.

ELEVATION= 1016. 1042. 1050.

CREL	SPWID	COQW	EXPW	ELEV	COQL	CAREA	EXPL
1038.2	61.9	3.1	1.5	0.0	0.0	0.0	0.0

DAM DATA									
TOPEL	COQD	EXPD	DAMWID						
1042.5	3.1	1.5	350.						

CREST LENGTH AT OR BELOW ELEVATION 2. 20. 215. 322. 330. 339. 347. 356. 395.  
1042.5 1043.0 1043.5 1044.0 1044.5 1045.0 1045.5 1046.0 1049.0

PEAK OUTFLOW IS 749. AT TIME 41.17 HOURS

PEAK OUTFLOW IS 373. AT TIME 41.17 HOURS

PEAK OUTFLOW IS 298. AT TIME 41.17 HOURS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)  
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS		
				RATIO 1 1.00	RATIO 2 0.50	RATIO 3 0.40
HYDROGRAPH AT	1 ( 0.73)	0.28	1 ( 21.44)	757. 379. 8.58)(	379. 8.58)(	303.
ROUTED TO	2 ( 0.73)	0.28	1 ( 21.20)	749. 373. 8.44)(	373. 8.44)(	298.

SUMMARY OF DAM SAFETY ANALYSIS

PLAN	ELEVATION	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM				
					STORAGE	OUTFLOW	.35.	.35.
1 .....		1038.20	1038.20	1042.50				
		0.	0.					
RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS	
1.00	1040.68	0.0	49.	749.	0.0	41.17	0.0	
0.50	1039.76	0.0	43.	373.	0.0	41.17	0.0	
0.40	1039.54	0.0	42.	298.	0.0	41.17	0.0	

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(412) 531-7111

Sheet \_\_\_\_\_ of \_\_\_\_\_  
Job MAPLE Creek Reservoir Pond B Job No 80138 D  
Subject Hydrologic Performance Plot  
Made By J.D.H. Date 11/24/80 Checked K.B.R. Date 1-15-81

1043

— — Minimum Dam Crest Elevation — —

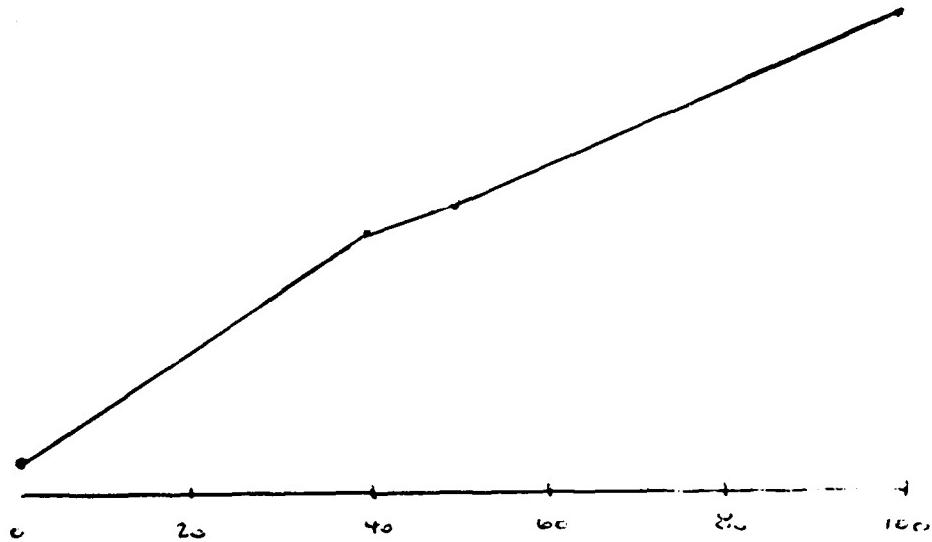
1042

MAXIMUM  
RESERVOIR  
WATER  
SURFACE  
ELEVATION

1040

1039

1038

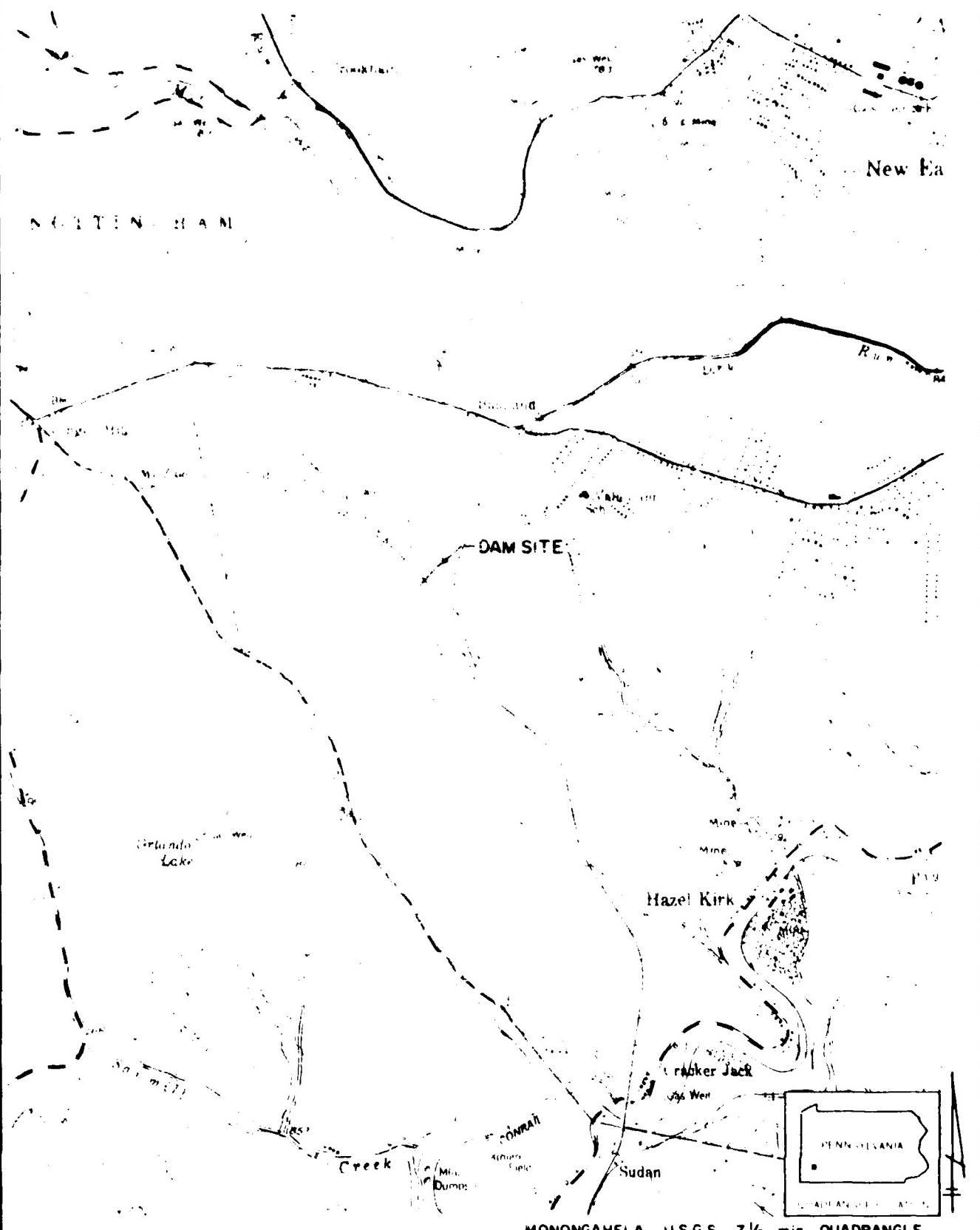


To PnLF

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APPENDIX E

PLATES

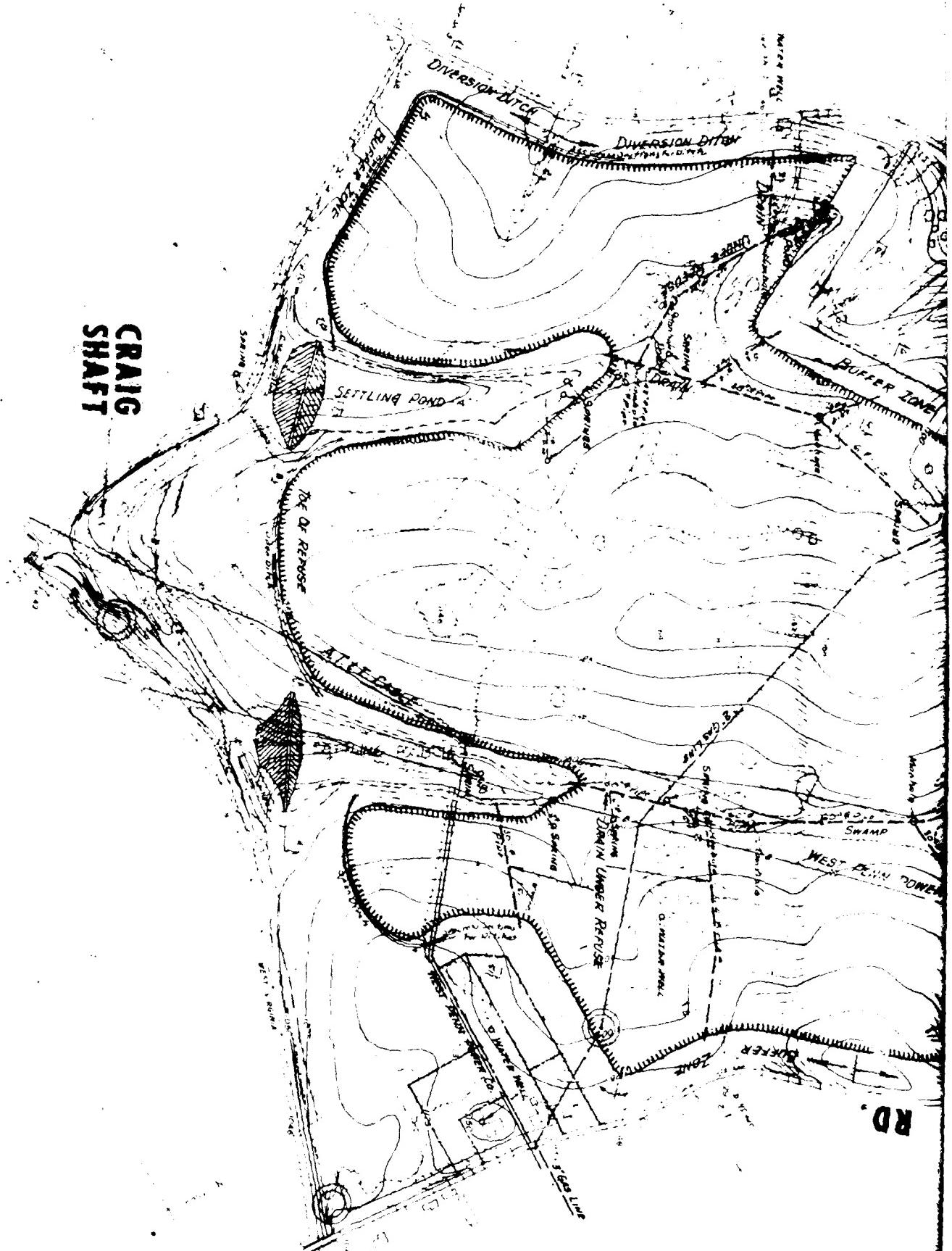


DATE: MARCH 1981	
SCALE: 1:2000	
DR: JF	CK:
PLATE I	

SILT POND B  
NATIONAL DAM INSPECTION PROGRAM  
**ACKENHEIL & ASSOCIATES** CONSULTING  
GEO SYSTEMS, INC. ENGINEERS  
1000 BANKSVILLE RD/PITTSBURGH PA 15216

REGIONAL  
VICINITY  
MAP

**CRAIG  
SHAFT**



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MT. ZION

RD.

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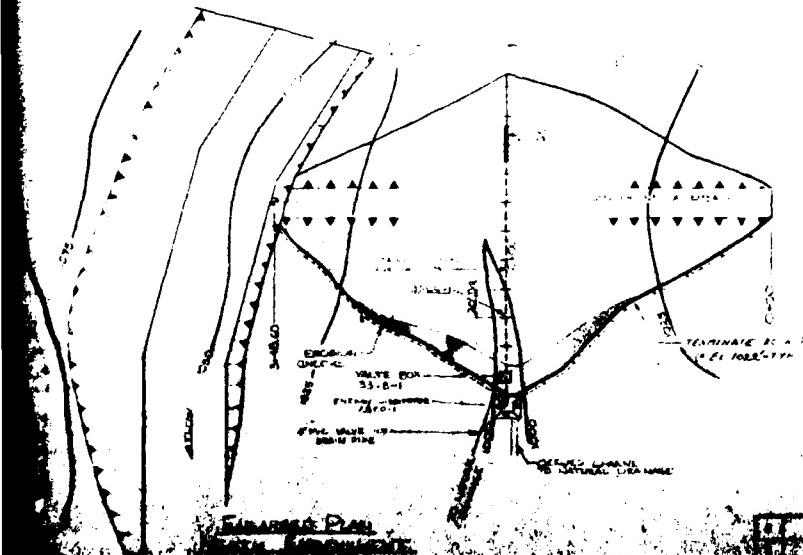
UNITED STATES STEEL CORPORATION  
FRICK DISTRICT UNIONTOWN, PA.

PREPARED BY	DATE	CHECKED BY	DATE	APPROVAL BY	DATE	APPROVAL BY	DATE
PROJECT NO.				SCALE			

PLATE II



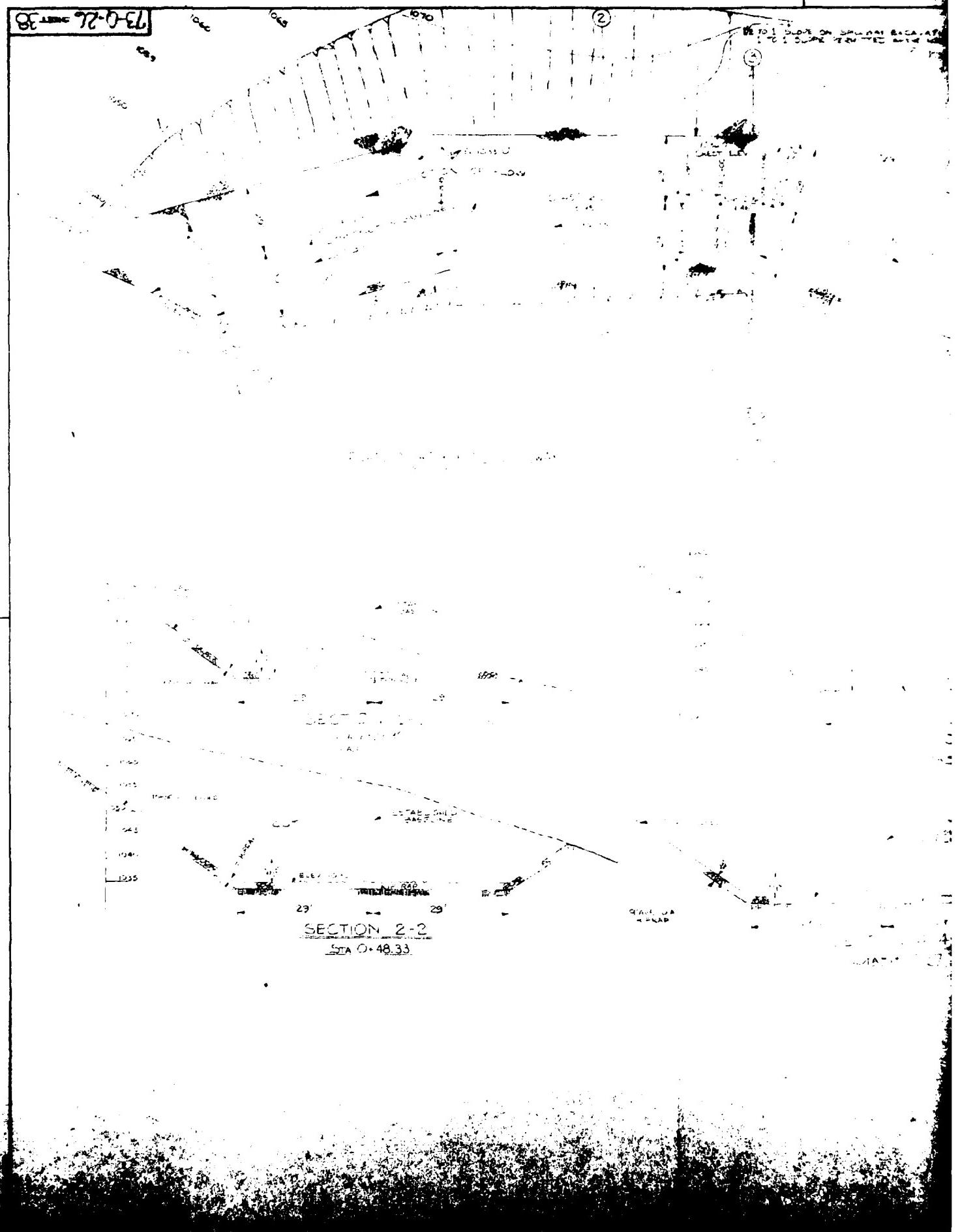
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MAPLE CREEK MINE  
REFUSE DISPOSAL AREA #2  
TYPICAL EMBANKMENT SECTION AND  
PLAN OF DELLANT LOCATION

UNITED STATES STEEL CORPORATION  
PITTSBURGH DISTRICT - BRUNSWICK, PA.

BEARING 73-0-36



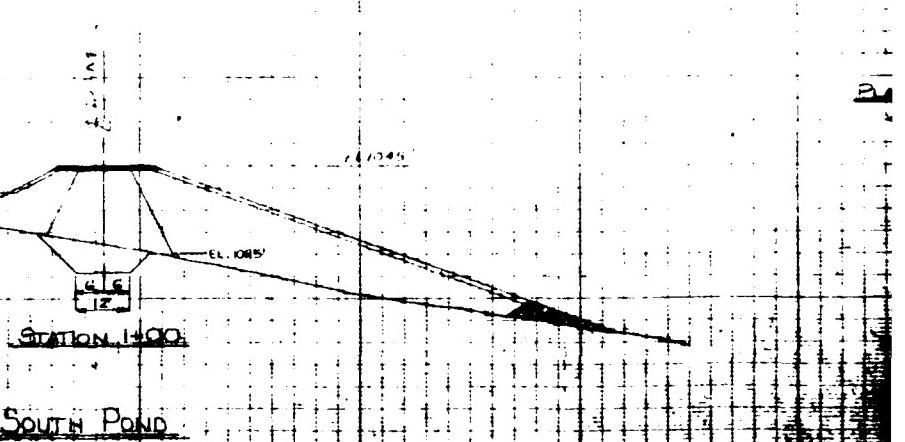
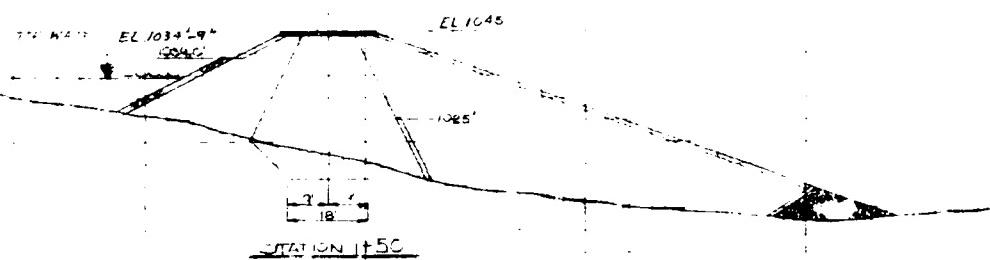
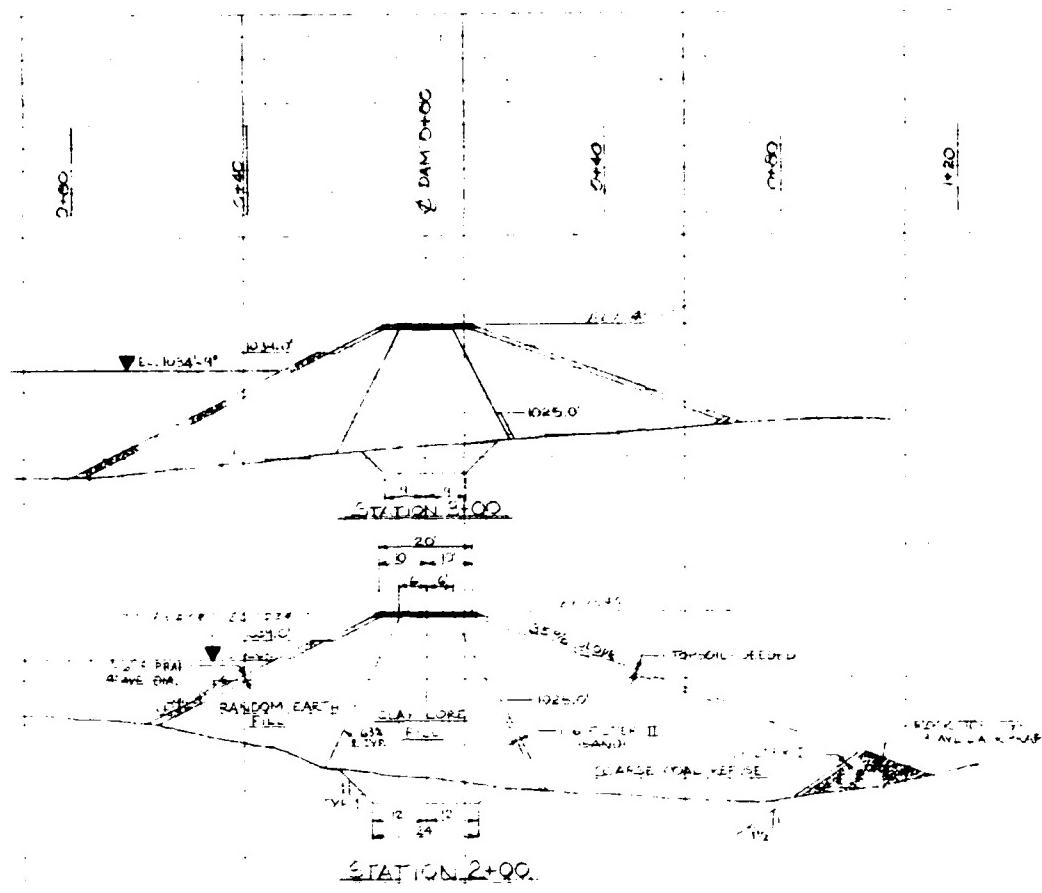
(2)

SECTION 2-2

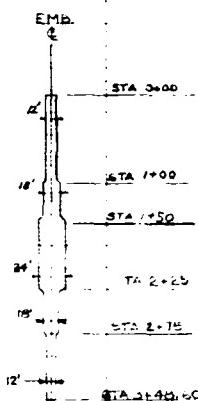
STA O+48.33

GRAD. 0.0  
FLAP

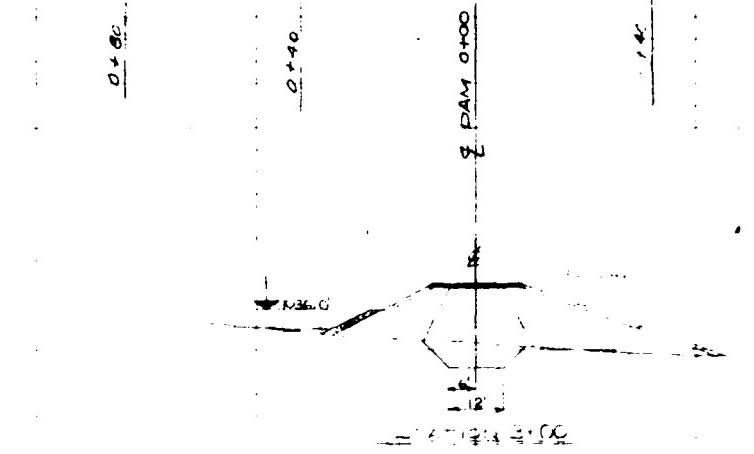




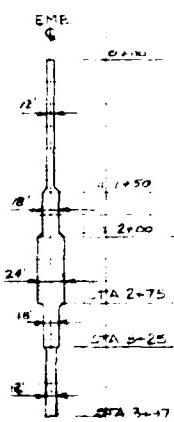
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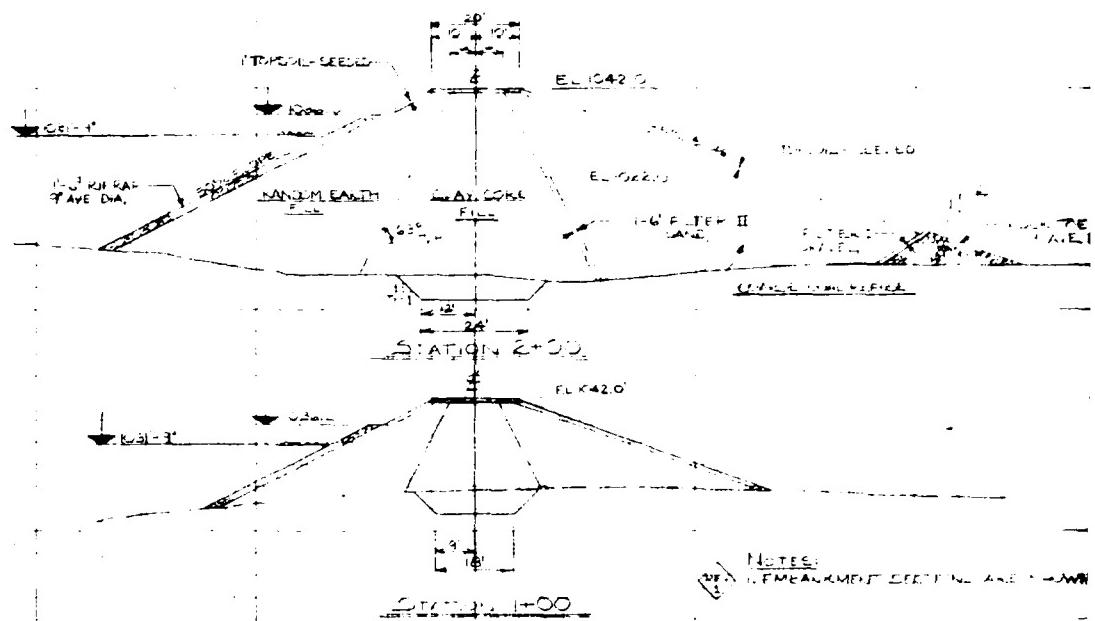
PLAN-CUT OFF TRENCH



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ON COPY FURNISHED;



PLAN CUT OFF TRENCH  
SOUTH POND  
SCALE 1:100



NOTES:  
IMPEACHMENT SECTION AND INDEX

## REFERENCE

13 Q 46 SHEET  
SECTION

MAPLE CREEK MINE  
REFUSE DISPOSAL AREA II  
TYPICAL EMBANKMENT SEC



UNITED STATES  
FRICK DISTRICT

NUMBER	DATE	CHARGE	DATE	AMOUNT
100000	10-1-70	100.00	10-1-70	100.00

PLATE V

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ON COPY FURNISHED TO B&G

RE-LODGE-LEVEE

1-6 FILTER II  
LAND

FILTER I  
LAND

ROCK TEE - TIP  
PALEO-GRAP

MAPLE CREEK REFUSE

NOTES:

1. EMBANKMENT SECTION ARE DRAWN FACING SW. STAB + CO.

REFERENCE DWGS:

13-Q-26 SHEET 29 TYP EMBANKMENT  
SECTION & PLAN IN DECANT LOC.

13-Q-26 SHEET 20 GENERAL PLAN

MAPLE CREEK MINE  
REFUSE DISPOSAL AREA II  
TYPICAL EMBANKMENT SECTIONS

USS

UNITED STATES STEEL  
FRICK DISTRICT UNIONTOWN PA

APPROVAL	DATE	APPROVAL	DATE	APPROVAL	DATE
APPROVED	1-1-76	APPROVED	1-7-76	APPROVED	1-7-76
APPROVED	1-1-76	APPROVED	1-7-76	APPROVED	1-7-76
APPROVED	1-1-76	APPROVED	1-7-76	APPROVED	1-7-76

PLATE V

LIST OF PLATES

- Plate I      Regional Vicinity Map.
- Plate II     Ginger Hill Refuse Area #2, Maple Creek  
Mine, Carroll Twp., Washington Co.
- Plate III    Maple Creek Mine Refuse Disposal Area #2.  
Typical Embankment Section and Plan of  
Decant.
- Plate IV     Maple Creek Mine Refuse Disposal Area #2.  
South Pond Spillway and Details.
- Plate V      Maple Creek Mine Refuse Disposal Area II.  
Typical Embankment Sections.

APPENDIX F

GEOLOGY

## GEOLOGY

### Geomorphology

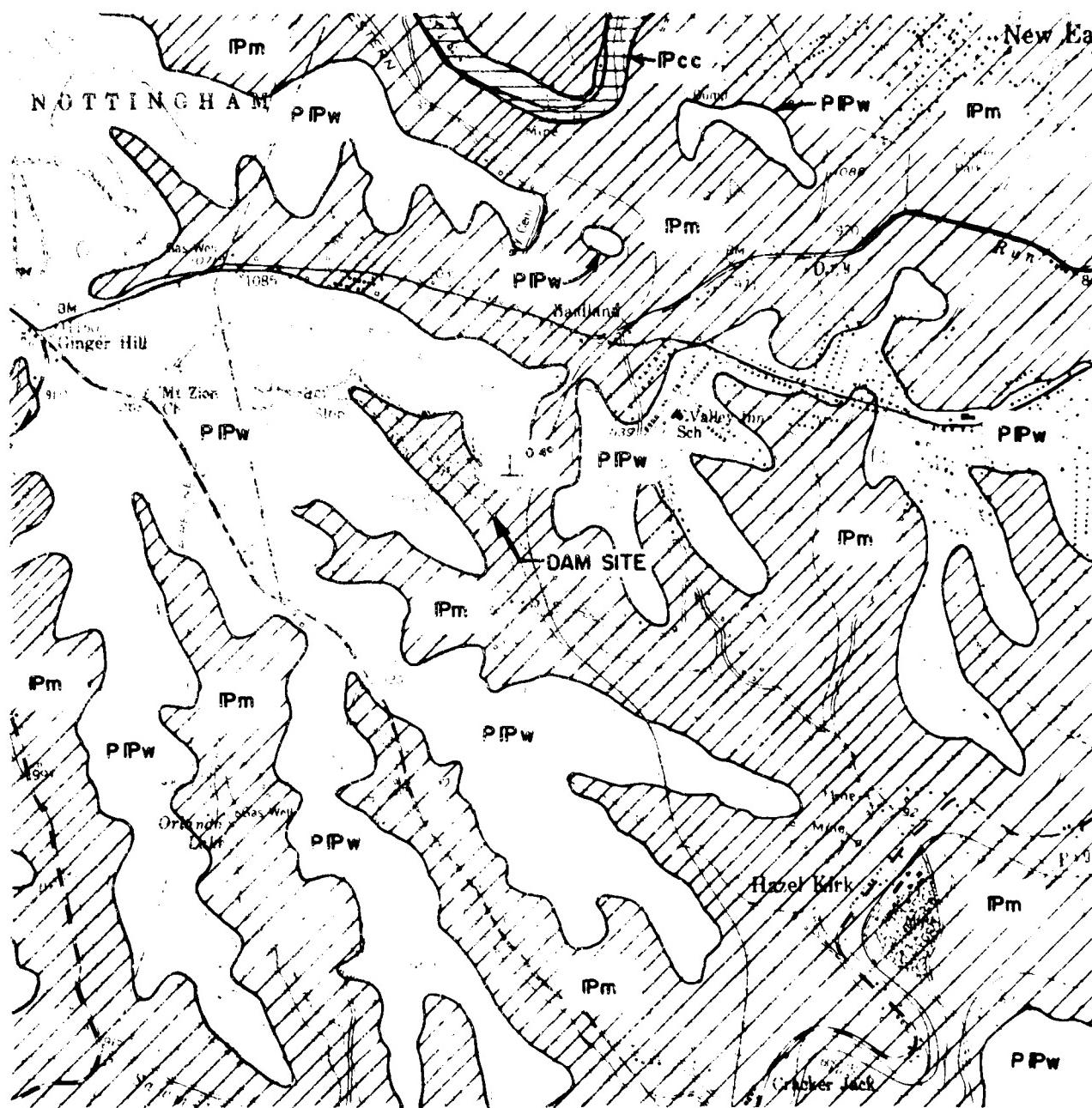
Silt Pond B is located within the Pittsburgh Plateau section of the Appalachian Plateau Physiographic Province. This area is characterized by essentially flat lying sedimentary rocks which have been deeply cut by streams to form steep sided valleys. The Pond is located near the head of an unnamed tributary to Pigeon Creek. The valley bottom of the unnamed tributary is about 200 feet below the adjacent ridges. These rounded hilltops are at Elevation 1100 to 1200 feet, and in a regional sense, are part of a broad, undulating plateau.

### Stratigraphy

General: Silt Pond B is located along the stratigraphic boundary of the Monongahela Group of Pennsylvania Age and the Dunkard Group of Permian Age. The Waynesburg Coal Seam, which marks the stratigraphic boundary between these two groups, outcrops near the dam site.

Mining Activity: The Waynesburg Coal Seam has been strip mined extensively in this area. The Pittsburgh Coal Seam, located about 300 feet below the dam, has been extensively deep mined.

Rock Types: Bedrock, which immediately underlies the site, consists of sandstones and shales.

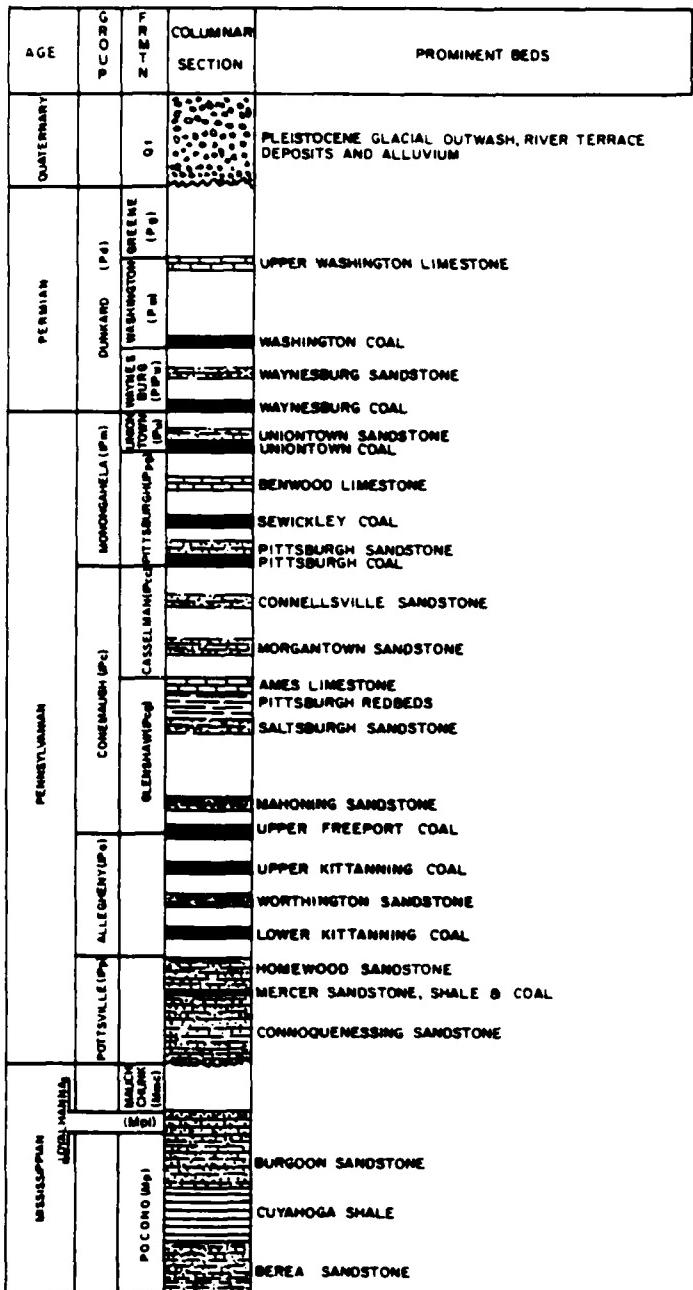


MONONGAHELA QUADRANGLE, WASHINGTON COUNTY, PENNSYLVANIA

SCALE: 0  $\frac{1}{2}$  MILE 1:24000  
 CONTOUR INTERVAL 20 FT DATUM IS MEAN SEA LEVEL  
 FORMATION CONTACT

DATA OBTAINED FROM PENNSYLVANIA TOPOGRAPHIC AND GEOLOGIC SURVEY GREATER PITTSBURGH REGION  
 GEOLOGIC MAP AND CROSS SECTIONS, 1975 and GREATER PITTSBURGH REGION STRUCTURE CONTOUR MAP, 1975

DATE: MARCH 1981	SCALE: 1"-2000'	SILT POND B NATIONAL DAM INSPECTION PROGRAM <b>ACKENHEIL &amp; ASSOCIATES</b> CONSULTING GEO SYSTEMS, INC. ENGINEERS 1000 BANKSVILLE RD / PITTSBURGH PA 15216	GEOLOGIC MAP
DR: JF CK:			



DATE: MARCH 1981  
 SCALE: 1":360'  
 DR: JF CK: JEB

SILT POND 8  
 NATIONAL DAM INSPECTION PROGRAM  
**ACKENHEIL & ASSOCIATES** CONSULTING  
 GEO SYSTEMS, INC. ENGINEERS  
 1000 BANKSVILLE RD / PITTSBURGH PA 15216

GEOLOGIC  
COLUMN

END

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6-18-1

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